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ABSTRACT

This manual was developed to help adult education teachers teach their students about computers as part of other courses in English, mathematics, social studies, or in a computer literacy course. Much of the manual has been written so that instruction can be given with or without the use of a computer. Although the manual is designed for use by the teacher, many of the activities and much of the information presented in it can be used directly by students. The manual contains nine sections. The first eight sections cover the following topics: history and development of computers; use of computers now and in the future; computer use and problems in society; computer-related careers; what a computer is; communicating instructions to a computer; how to use a computer; and computer words. Each of these sections contains information, vocabulary, student activities, and questions to answer. Materials are illustrated with line drawings. Many of the activities have specified reading levels (grades 1 through 8 or grades 9 through 12), and some have suggestions for types of subject matter in which the activities could be included. The final section contains two pretests and two posttests, one set for grade 8 and one set for grade 10 reading level. (KC)

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WELCOME TO THE WORLD OF COMPUTERS

PART 1

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
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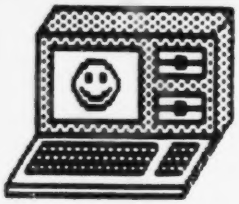

INTRODUCTION

WHY?

The Adult Education Computer Literacy Manual was developed because of a current need to acquaint our adult students with computers and their functions. Many adult students are currently receiving educational instruction using computers, but know nothing about the computer they're using or its many uses. Recent legislative educational reforms have stipulated that all 7th and 8th grade students in the public schools must receive instruction in computer literacy. This leaves Texas students computer literate, but not their parents or other adults. Thus, this manual.

The Curriculum Manual

We've tried to develop the manual remembering all the different aspects of adult education classes, students, and teachers.

Much of the manual has been written so that instruction can be given with (hands-on) or without a computer; as part of an established class (reading, etc), or as a complete class just on computer literacy. Many of the activities, as well as the pre and posttests have specified levels, based on reading ability and type of program. (In most cases, this is Level 1 = 1-8th grade, Level 2 = 9-12th grade.) We've tried to assign the type of subject matter (math, language arts, etc.) where some of the activities could be used. We've also included TEA's Computer Literacy list of the essential elements and objectives if you would like to be more specific in certain areas. You can use the manual to teach from, or in many cases, we believe the student can read and understand the manual on his/her own.

Once you the teacher or administrator have read over the manual and are familiar with it, you can set up your class and teach the computer skills in any fashion you would like.

The Computer Literacy Manual is designed for use by teachers with little previous computer experience and can be taught successfully by math, English, science, and social studies teachers.

If you are a math teacher, you will find much here of interest to math teachers: logical thinking, problem solving, and critical analysis.

If you are an English teacher, you are extremely well qualified to handle this. Programming means writing for the computer. All the rules for clear and logical writing in English also apply to writing for the computer.

If you teach something else - Welcome aboard! All teachers have something to contribute to this course. Language teachers quickly discover that computer languages also have grammar and spelling rules. Social studies teachers have special insights to bring to discussions of the impact of computers on people and the society. Business teachers know about business applications of computers. Teachers in the arts have special concern for creative uses of computers.

Staying ahead of the class - Before starting a new main part in the manual, it is a good idea to read over all the information in that part. Work through the hands-on activities yourself. This will keep you comfortably ahead of most of your students...but not all.

There will be one or two students in every class who cannot be held back. They are inquisitive, and may have more time than you. Soon they will know more secrets about the computer than you do. Nevertheless, you will quickly find that you have something to teach them that they cannot get by themselves: thinking and writing in a clear, well-structured style. In exchange, you could use these knowledgeable students as helpers and class resources.

Remember, computers are fun! If you have any questions, suggestions, or just want to yell "HELP," please call us:

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The following people are also a part of the manual. They have read and edited chapters, taken the pre and posttest, typed and retyped chapters, worked on the word searches, the writing activities, and the computer programs.

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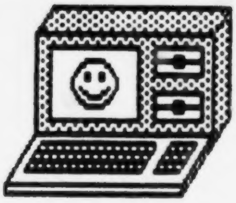

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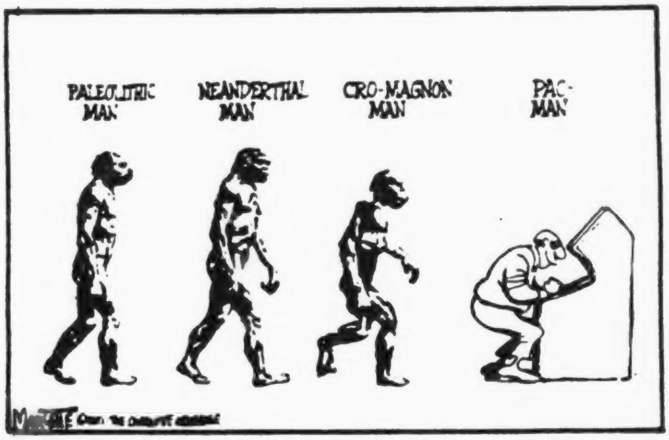
DID YOU KNOW??

BABIES AND COMPUTERS

In January of 1980 more computers were built than children were born. By 1983, there were as many computers in the world as people.

HISTORY AND DEVELOPMENT OF COMPUTERS


PALEOLITHIC MAN
NEANDERTHAL MAN
CRO-MAGNON MAN
PAC-MAN

TEA's
ESSENTIAL ELEMENT

HISTORY AND DEVELOPMENT OF COMPUTERS

A. Identify and describe important pre-computer aids to calculation (i.e., counting with fingers and toes, pebbles and stones, base 10 numeration system, and counting with the abacus).

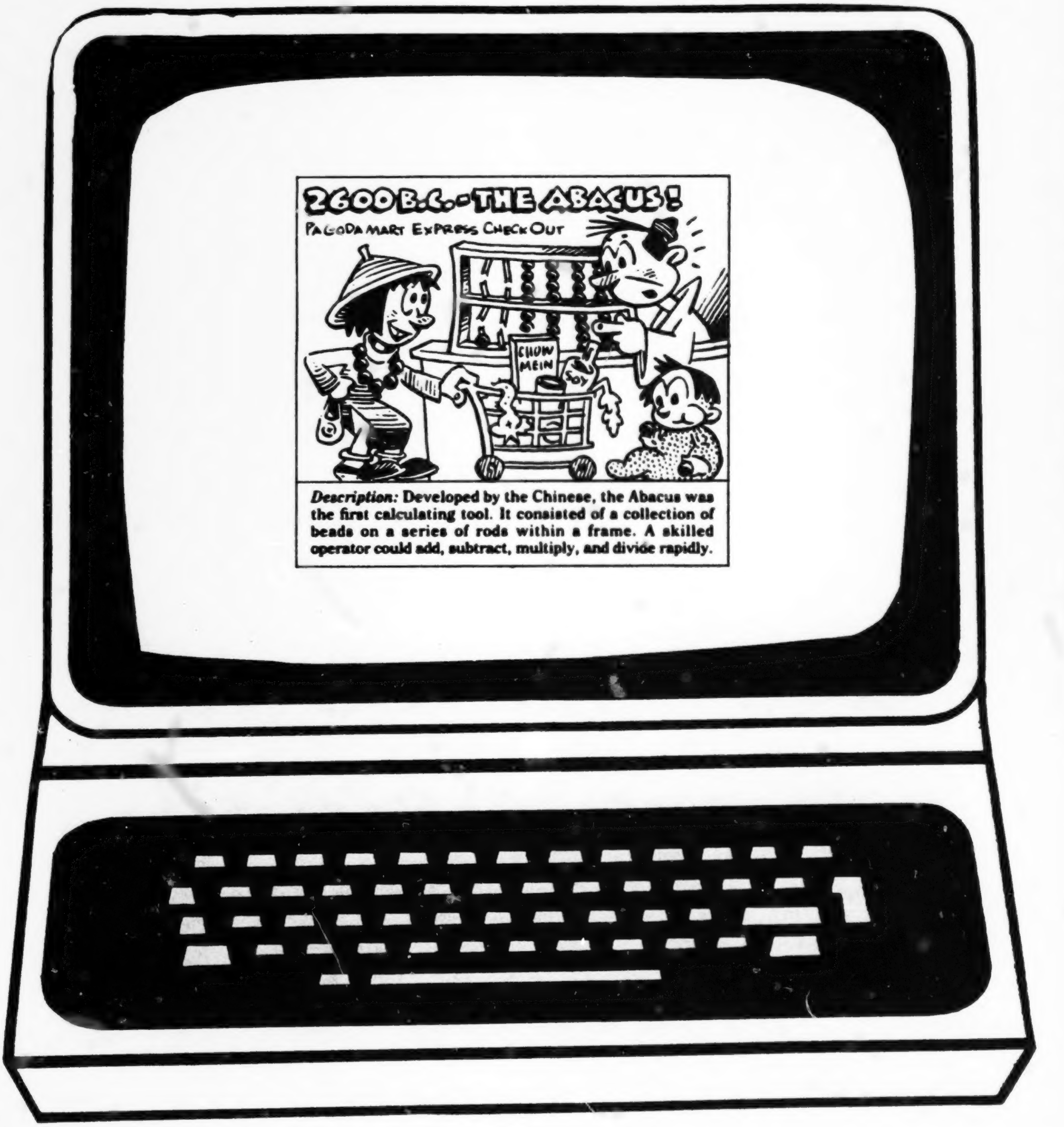
B. Name individuals and describe their contribution to the historic origins of the computer.

1. Describe the contributions of John Napier: the introduction of logarithms, invention of Napier's rods.
2. Describe the contributions of Blaise Pascal: first mechanical adding machine.
3. Describe the contribution of Leibnitz: first mechanical calculating machine.
4. Describe the contributions of Joseph Jacquard: punched cards.
5. Describe the contributions of Charles Baggage: difference machine.
6. Describe the contributions of George Boole: Boolean logic.
7. Describe the contributions of Herman Hollerith: Tabulating machine.
8. Describe the contributions of Ada Lovelace: first programmer.

C. Identify and describe characteristics of each generation of computers.

1. Describe the characteristics of 1st generation computers (tubes).
2. Describe the characteristics of 2nd generation computers (transistors).
3. Describe the characteristics of 3rd generation computers (integrated circuits).
4. Describe the characteristics of 4th generation computers (large scale integrated circuits).

DID YOU KNOW??


2600 B.C. - THE ABACUS!
PAGODA MART EXPRESS CHECK OUT
CHOW MEIN
SOY

Description: **Developed by the Chinese, the Abacus was the first calculating tool. It consisted of a collection of beads on a series of rods within a frame. A skilled operator could add, subtract, multiply, and divide rapidly.**

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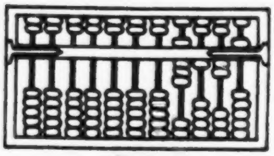
THE HISTORY OF THE COMPUTER

Since the earliest time, people have used their fingers to show, "how many." Our number system is based on "ten" probably because it was easy to show large numbers in groups of ten by holding up both hands.

Besides using their fingers, primitive people needed a way to calculate and store information for future uses. They did this by collecting small stones and putting them in piles, i.e., to represent animals killed. An even better way was to scratch notches or symbols into the stone walls or wood to record and store information.



Abacus

The abacus was one of the first devices or tools used to express numbers. The Chinese abacus was developed about 5,000 years ago; was built out of wood and beads, and small enough to carry around. Because people who are good at using an abacus can often do calculations as quickly as a person who is using a calculator, the abacus is still used in some countries today.

Early Ways of Counting

In 1617, a mathematician from Scotland, named John Napier invented calculating rods to help people multiply large numbers. These rods were called Napier's Bones and were originally made from bone or ivory. The rods didn't actually do the multiplication, but by moving the rods around and reading rows of numbers, a person could compute the product of two large numbers quickly and easily.

Calculating Machines With Moving Parts

Two inventors developed calculating machines that had moving parts. In 1642, Blaise Pascal invented the "Arithmetic Machine" that used gears and notched wheels that moved each time a number was added or subtracted. In 1694, the "Stepped Reckoner" was built by a German mathematician Gottfried Wilhelm von Leibniz. The "Stepped Reckoner" used "stepped cylinders" rather than wheels and gears, and could multiply and divide as well as add and subtract.

Using Punched Cards

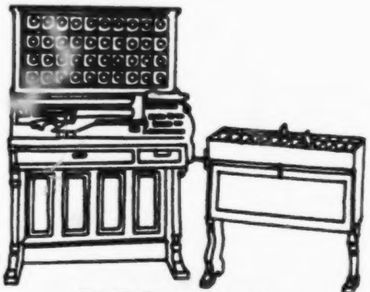
In 1801, Joseph Jacquard of France invented a new type of loom for weaving cloth. He used "punched cards" so that when the needle would pass through a punched hole, it would become part of the pattern, depending on the pattern of holes. The process was repeated over and over and if a weaver wanted to repeat a pattern, he simply ran the same cards through the loom in the same order. Although Joseph Jacquard had no idea about computers when he started using punched cards, other computer inventors in later years used his idea.

First Calculating Machine

The analytical engine was probably the first calculating machine. It was invented in England in 1835 by Charles Babbage. The analytical engine was suppose to receive instructions, use punched cards, and print the results (output). The tools in Babbage's time were just not precise enough to build this complicated machine. Babbage is called the father of computers because his ideas formed the basis for modern-day computer programming. Lady Ada Agusta Lovelace financially supported Charles Babbage in his quest to build the analytical engine. She convinced Babbage to use the "binary number system" instead of the decimal number system.

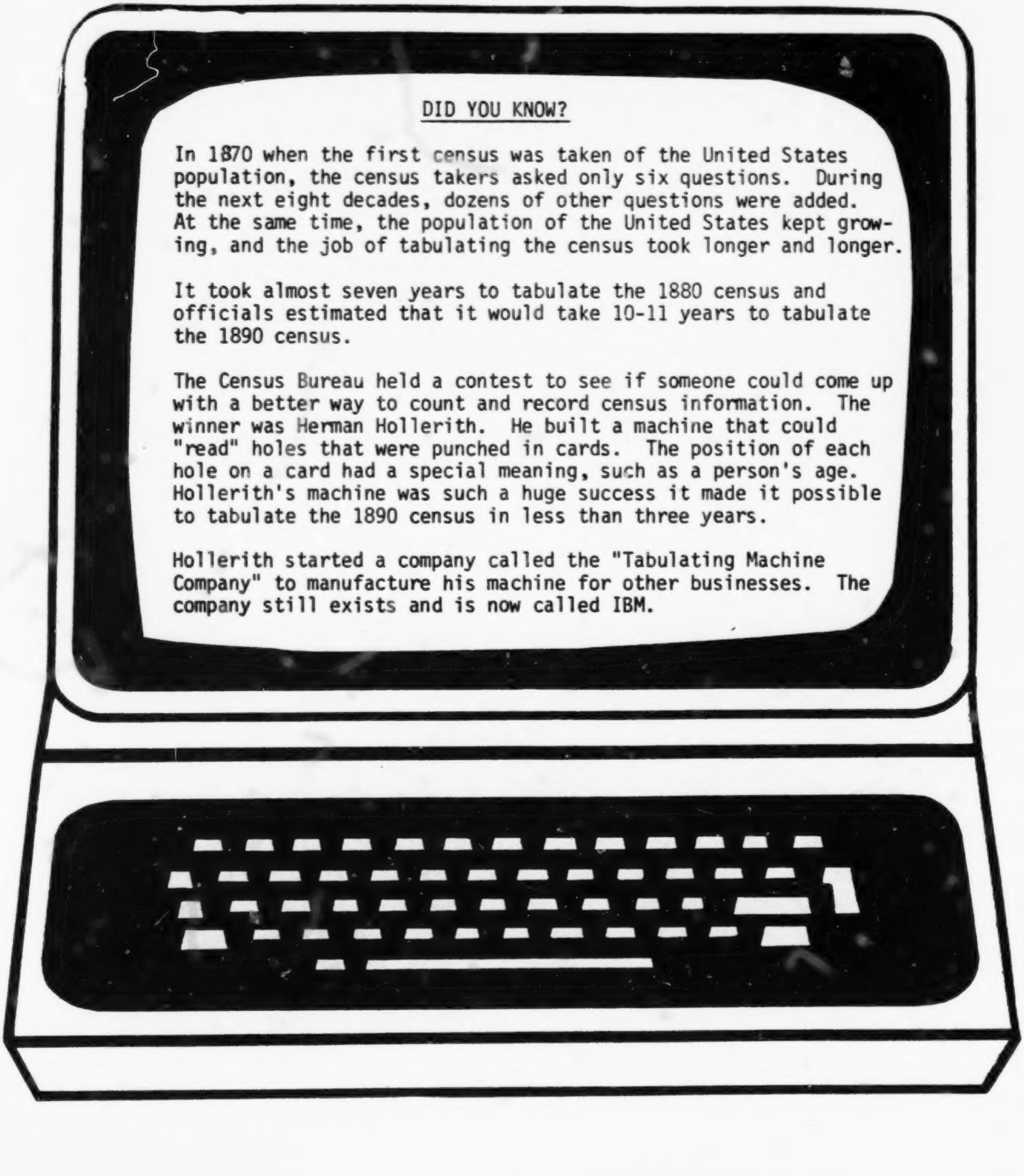
The 1890 Census

Using the "punched card" idea, Herman Hollerith invented the "Tabulating Machine." Its main job was to tabulate all the 1890 census data. Information from each person was punched on cards and put into the machine. The machine pushed pins against the cards. If a pin went through a punched hole it made contact with a metal surface below the card completing an electric curcuit and made the machine add to its items being counted.



Hollerith's Tabulating Machine

DID YOU KNOW??



DID YOU KNOW?

In 1870 when the first census was taken of the United States population, the census takers asked only six questions. During the next eight decades, dozens of other questions were added. At the same time, the population of the United States kept growing, and the job of tabulating the census took longer and longer.

It took almost seven years to tabulate the 1880 census and officials estimated that it would take 10-11 years to tabulate the 1890 census.

The Census Bureau held a contest to see if someone could come up with a better way to count and record census information. The winner was Herman Hollerith. He built a machine that could "read" holes that were punched in cards. The position of each hole on a card had a special meaning, such as a person's age. Hollerith's machine was such a huge success it made it possible to tabulate the 1890 census in less than three years.

Hollerith started a company called the "Tabulating Machine Company" to manufacture his machine for other businesses. The company still exists and is now called IBM.

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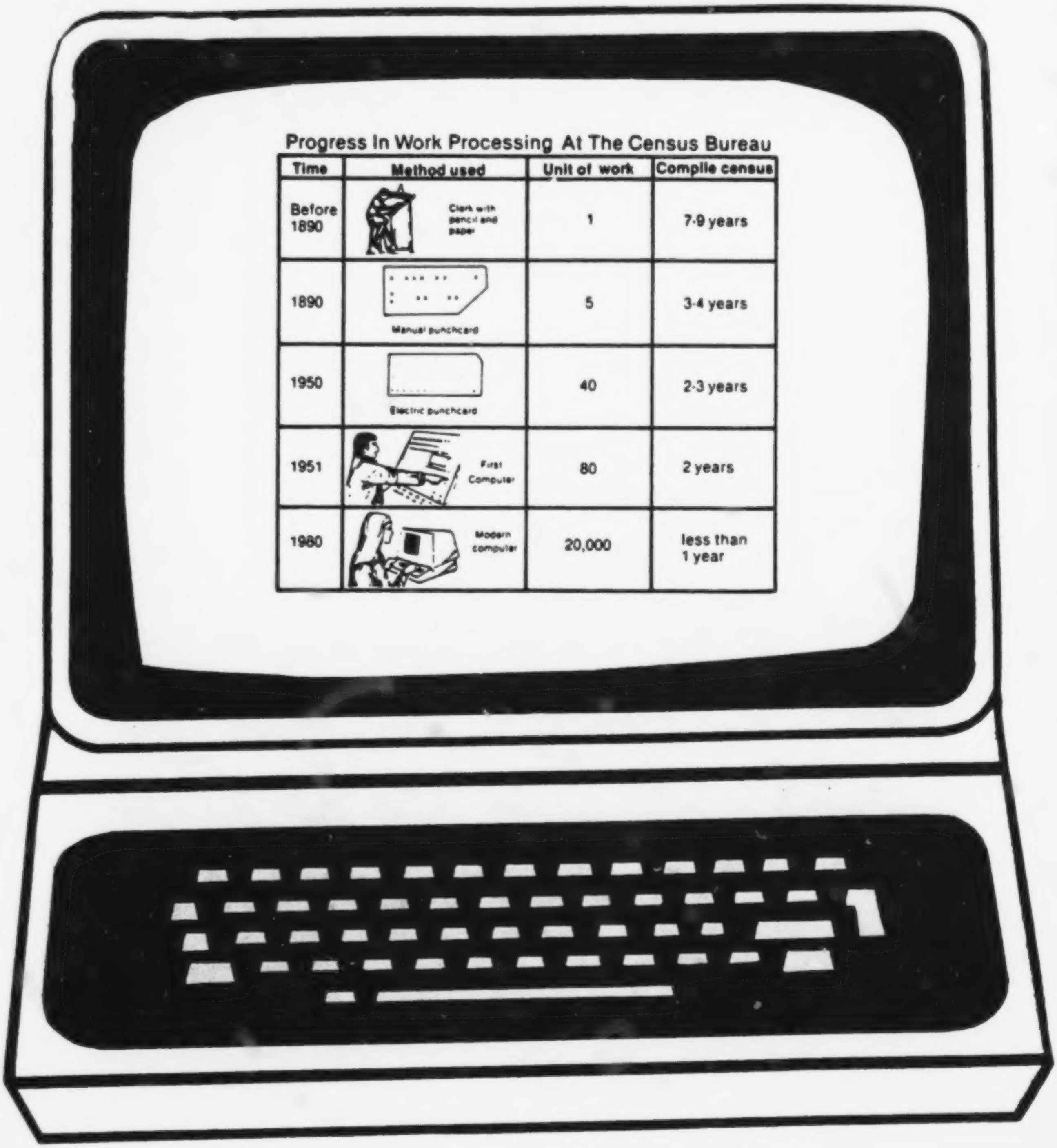
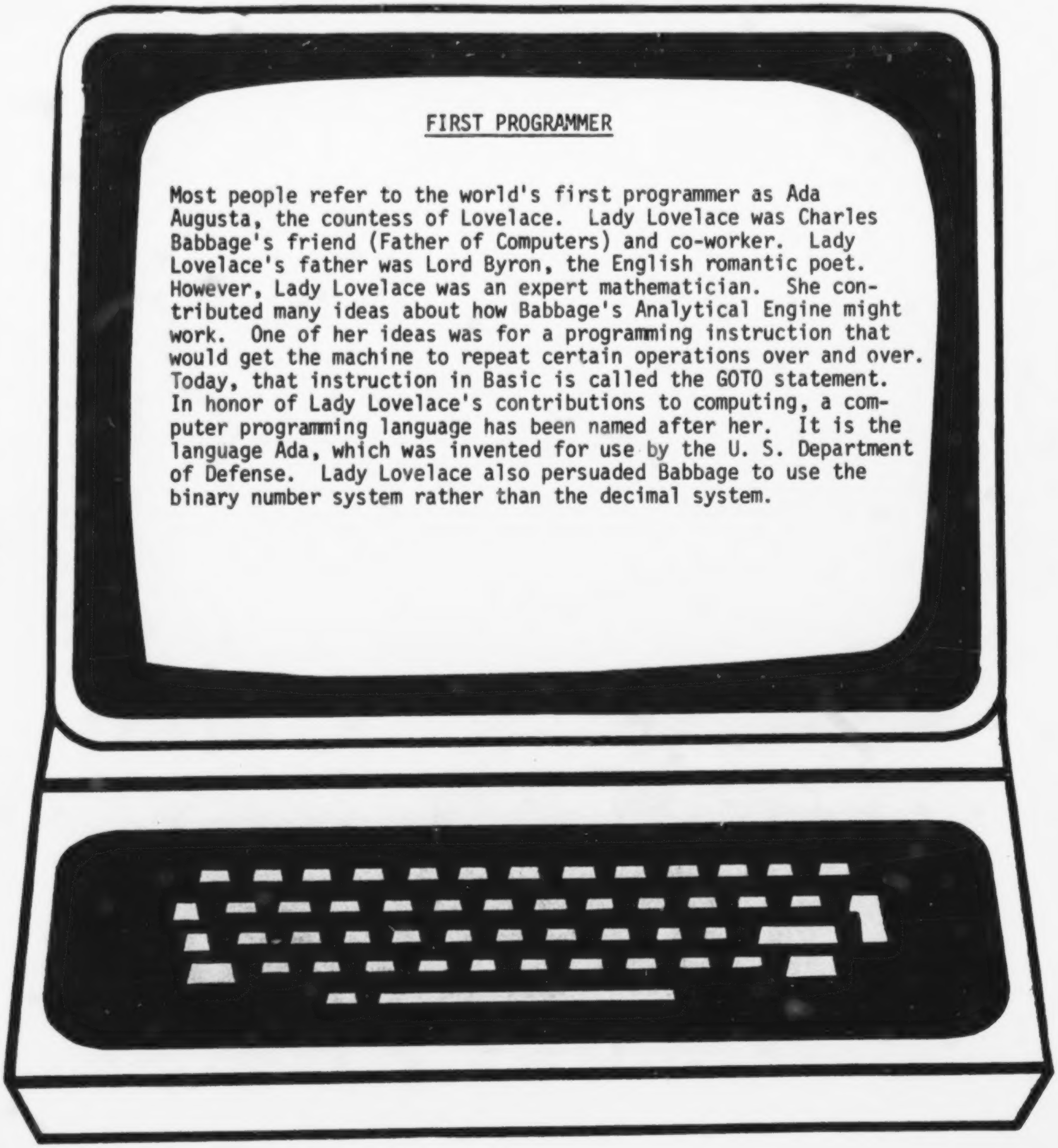
DID YOU KNOW??



Progress In Work Processing At The Census Bureau

Time	Method used	Unit of work	Compile census
Before 1890	Clerk with pencil and paper	1	7-9 years
1890	Manual punchcard	5	3-4 years
1950	Electric punchcard	40	2-3 years
1951	First Computer	80	2 years
1980	Modern computer	20,000	less than 1 year

DID YOU KNOW??



FIRST PROGRAMMER

Most people refer to the world's first programmer as Ada Augusta, the countess of Lovelace. Lady Lovelace was Charles Babbage's friend (Father of Computers) and co-worker. Lady Lovelace's father was Lord Byron, the English romantic poet. However, Lady Lovelace was an expert mathematician. She contributed many ideas about how Babbage's Analytical Engine might work. One of her ideas was for a programming instruction that would get the machine to repeat certain operations over and over. Today, that instruction in Basic is called the GOTO statement. In honor of Lady Lovelace's contributions to computing, a computer programming language has been named after her. It is the language Ada, which was invented for use by the U. S. Department of Defense. Lady Lovelace also persuaded Babbage to use the binary number system rather than the decimal system.

INDIVIDUALS AND THEIR CONTRIBUTIONS TO THE HISTORIC ORIGINS OF THE COMPUTER

John Napier: the introduction of logarithms and the invention of Napier's rods

Blaise Pascal: first mechanical adding machine

Leibnitz: first mechanical calculating machine

Joseph Jacquard: punched cards

Charles Babbage: difference machine

George Boole: Boolean logic

Herman Hollerith: tabulating machine

Ada Lovelace: first programmer

THE GENERATION OF COMPUTERS

The age of "modern computers" began in 1944 with the Mark I. Mark I was known as the world's first electromechanical computer. It was built by Howard Ailen, an American engineer at Harvard University. It accepted information through punched cards, stored and processed information, printed results and took only a few seconds to calculate a math problem. However, the Mark I took up the space of a school gymnasium. Scientists soon started building computers that had almost no moving parts. They were electronic, not mechanical as was the Mark I.

First Generation Computers

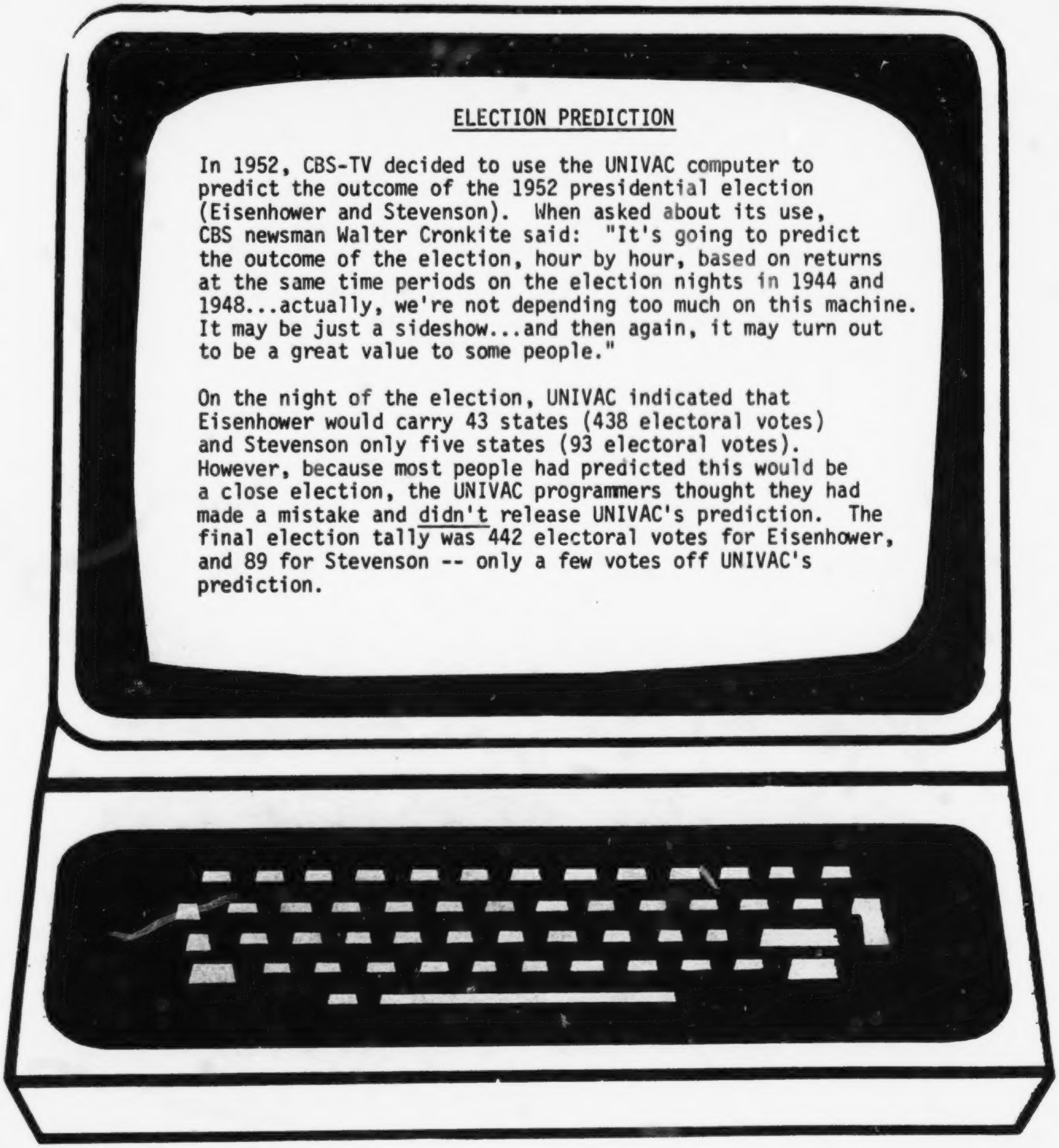
The first all digital computer was the ENIAC. It was completed in 1946 and weighed over 30 tons. It conducted electricity through its 18,000 vacuum tubes. The vacuum tubes got so hot the ENIAC had to have special air conditioning units to keep it cooled down. The longest ENIAC ever ran without "burning out" or stopping was 120 consecutive hours (five days). ENIAC used so much electricity that the city lights dimmed when it was turned on at night. The ENIAC was 300 times faster than the Mark I. In just two hours, the ENIAC could solve a problem that would have taken 100 engineers working eight hours a day an entire year to solve.

The UNIVAC was the first commercial computer and was designed by the same scientists as the ENIAC. It was the first computer that could check for errors and deal with both numeric and descriptive data (data other than just numbers).

Second Generation Computers

Transistors soon replaced (1950's) vacuum tubes and they could conduct electricity more quickly and efficiently. A transistor didn't get as hot or burn out like a vacuum type and was much smaller. However, only the government and very large businesses could afford computers since they were still expensive and difficult to run.

DID YOU KNOW??



ELECTION PREDICTION

In 1952, CBS-TV decided to use the UNIVAC computer to predict the outcome of the 1952 presidential election (Eisenhower and Stevenson). When asked about its use, CBS newsman Walter Cronkite said: "It's going to predict the outcome of the election, hour by hour, based on returns at the same time periods on the election nights in 1944 and 1948...actually, we're not depending too much on this machine. It may be just a sideshow...and then again, it may turn out to be a great value to some people."

On the night of the election, UNIVAC indicated that Eisenhower would carry 43 states (438 electoral votes) and Stevenson only five states (93 electoral votes). However, because most people had predicted this would be a close election, the UNIVAC programmers thought they had made a mistake and didn't release UNIVAC's prediction. The final election tally was 442 electoral votes for Eisenhower, and 89 for Stevenson -- only a few votes off UNIVAC's prediction.

Third Generation Computers

In 1964, tiny integrated circuits (IC's) were developed to take the place of transitors. Integrated circuits were very small, mass-produced and could operate 100 times faster than second generation computers. Low cost, small computers were being bought by many companies.

Fourth Generation Computers

By the mid 1970's, scientists could put thousands of integrated circuits on one tiny silicon chip. It was called an integrated circuit chip. Computers with integrated circuit chips were even smaller and less expensive and could perform over 10 million calculations in one second.

Fifth General Computers

Currently, scientists are working in the field of artificial intelligence. Artificial intelligence is the science that tries to teach computers to learn, think, and reason like humans. The fifth-generation computer is expected to have dozens of processing units and to handle up to ten billion calculations per second.

THE EVOLUTION OF THE COMPUTER

FIRST GENERATION: 1954-59

- Vacuum tubes
- slow
- machine language
- small storage
- physically large

SECOND GENERATION 1959-64

- Transistors
- Faster (microsec.)
- Fortran
- Larger storage
- smaller
- lower cost

THIRD GENERATION 1964..??

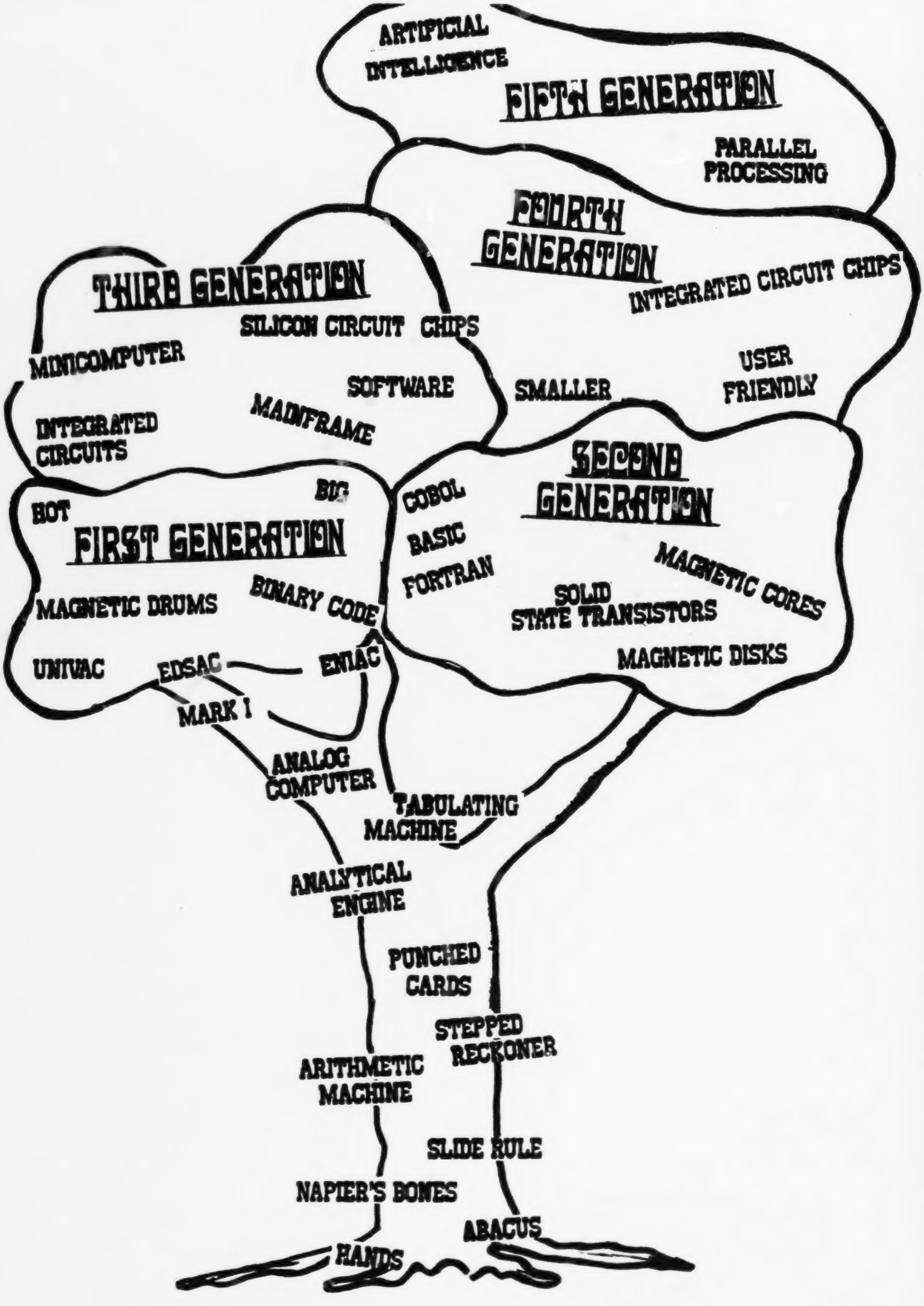
- Core storage
- Faster (nanosec.)
- Multiple languages
- Mass storage
- Smaller
- Timesharing

FOURTH GENERATION 1970 - ??

- VLSI, LSI
- Speed
- Greater reliability
- Large storage

FIFTH GENERATION ?

- Parallel processing
- Speed
- Optics
- Voice recognition
- Inferencing
- Expert systems


ARTIFICIAL INTELLIGENCE
FIFTH GENERATION
PARALLEL PROCESSING
FOURTH GENERATION
INTEGRATED CIRCUIT CHIPS
USER FRIENDLY
SMALLER
THIRD GENERATION
SILICON CIRCUIT CHIPS
MINICOMPUTER
SOFTWARE
MAINFRAME
INTEGRATED CIRCUITS
SECOND GENERATION
COBOL
BASIC
FORTRAN
MAGNETIC CORES
SOLID STATE TRANSISTORS
MAGNETIC DISKS
HOT
BIG
FIRST GENERATION
MAGNETIC DRUMS
BINARY CODE
UNIVAC
EDSAC
ENIAC
MARK I
ANALOG COMPUTER
TABULATING MACHINE
ANALYTICAL ENGINE
PUNCHED CARDS
STEPPED RECKONER
ARITHMETIC MACHINE
SLIDE RULE
NAPIER'S BONES
ABACUS
HANDS

CHRONOLOGY OF THE HISTORY OF COMPUTERS

3000 B.C.	The abacus is developed in Babylonia.
A.D. 700–900	Europeans begin using Hindu-Arabic math.
1600	Hindu-Arabic math is in common use throughout Europe.
1614	John Napier introduces logarithms.
1617	Napier invents rods.
1623	Wilhelm Schickard invents the mechanical calculator.
1630–1633	William Oughtred and Richard Delamain introduce the slide rule.
1644–1645	Blaise Pascal completes his calculator.
1672–1674	Leibniz builds his first calculator.
1801	Joseph-Marie Jacquard develops a loom programmed by punched tape.
1820	The Arithmometer, the first commercial calculator, is introduced.
1823	Charles Babbage begins the Difference Engine project.
1834	Babbage starts designing the Analytical Engine.
1847	George Boole publishes *The Mathematical Analysis of Logic*.
1853	Pehr and Edvard Scheutz complete their Tabulating Machine.
1854	Boole publishes *The Laws of Thought*.
1875	Frank Baldwin opens a workshop in Philadelphia, inaugurating the American calculator industry.
1876–1878	Baron Kelvin builds his harmonic analyzer and tide predictor machines.
1878	Ramon Verea patents a calculator capable of direct multiplication and division.
1885	Dorr Felt devises the Comptometer, a key-driven adding and subtracting calculator.
1889	Felt's Comptograph, containing a built-in printer, is introduced.

Chronology of the History of Computers

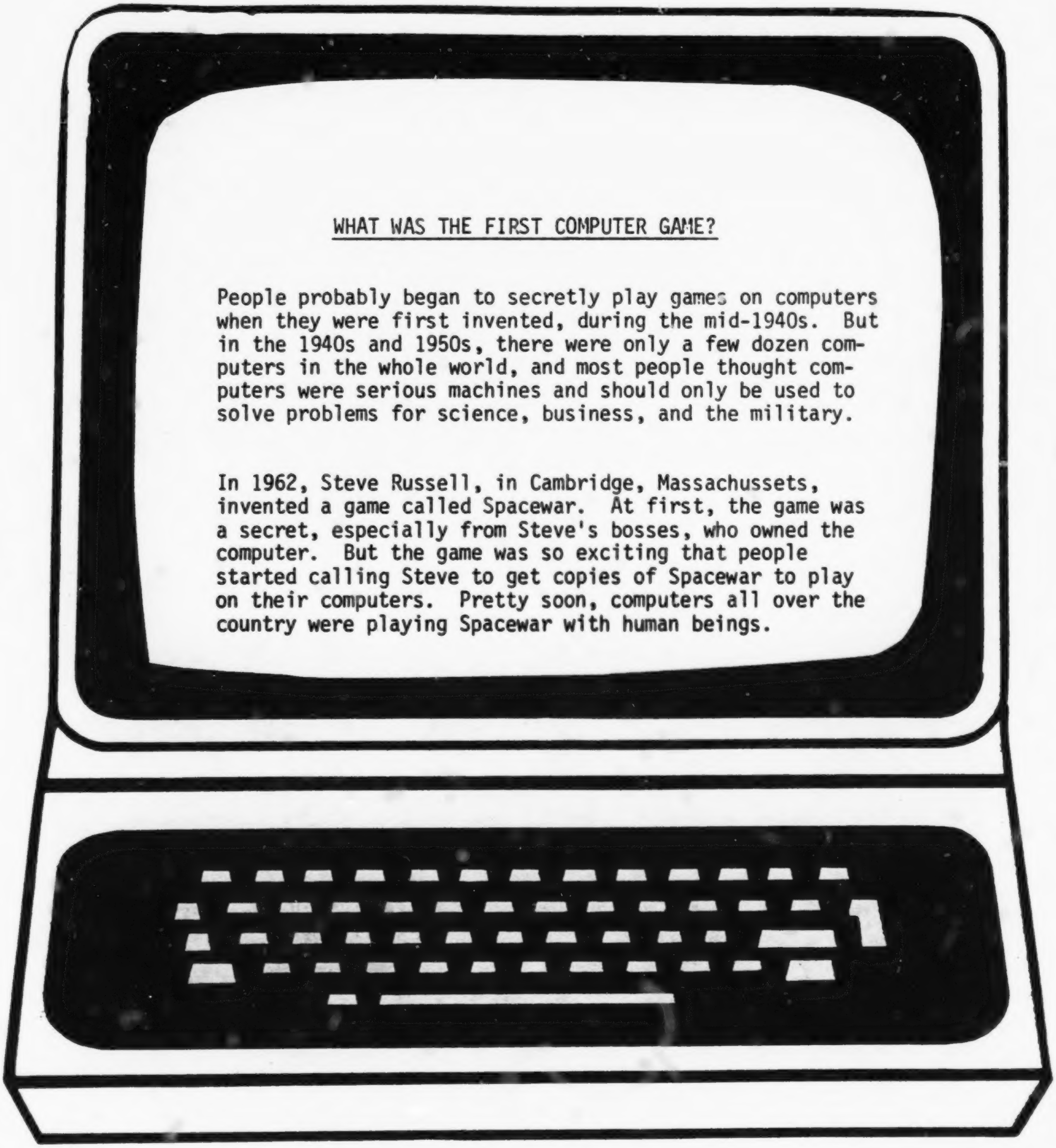
1890	Herman Hollerith's punch cards and tabulating equipment are used in the U.S. Census.
1892	William S. Burroughs introduces an adder-subtracter with a superior printer.
1893	The Millionaire, the first efficient four-function calculator, is invented.
1900–1910	Mechanical calculators become commonplace.
1906	Lee De Forest devises a three-electrode tube, or triode.
1910–1913	Bertrand Russell and Alfred North Whitehead publish *Principia Mathematica*.
1911	Hollerith Tabulating Machine Company merges into Computing-Tabulating-Recording Corporation (CTR).
1914	Thomas Watson, Sr., joins CTR.
1919	W. H. Eccles and F. W. Jordan publish a paper on flip-flop circuits.
1924	CTR becomes International Business Machines Corporation (IBM).
1930	Vannevar Bush completes his differential analyzer, stimulating international interest in analog computing.
1937	Alan Turing publishes "On Computable Numbers."
1938	Konrad Zuse finishes his Z1, the first binary calculating machine.
	Claude Shannon publishes "A Symbolic Analysis of Relay and Switching Circuits."
1939	Bell Labs builds the Complex Number Calculator.
1941	Zuse assembles the Z3, the first electromechanical general-purpose program-controlled calculator.
1942	John V. Atanasoff and Clifford Berry's electronic calculating machine, one of the first calculating devices with tubes, goes into operation.
1943	IBM-Harvard Mark I is completed.
	First Colossus code-breaking machine is installed at Bletchley Park.
1944	J. Presper Eckert and John W. Mauchly conceive of the stored-program computer.
1945	ENIAC, the first fully functional electronic calculator, goes into operation in November.
	John von Neumann writes "First Draft of Report on the EDVAC."

	IBM becomes the largest business machine manufacturer in the United States.
1946	Arthur Burks, Herman Goldstine, and von Neumann write "Preliminary Discussion of the Logical Design of an Electronic Computing Instrument."
	Von Neumann starts a computer project at the Institute for Advanced Study.
	Eckert and Mauchly establish the Electronic Control Company, America's first computer manufacturer.
1947	Bell Labs invents the point-contact transistor.
1948	IBM assembles the SSEC electromechanical computer, which runs a stored program on 27 January.
	Manchester University's Mark I prototype runs the first fully electronic stored program on 21 June.
1949	EDSAC, the first full-scale electronic stored-program computer, begins operating at Cambridge University in June.
	BINAC, the first stored-program computer in America, is tested in August.
1950	Remington Rand buys the Eckert-Mauchly Computer Corporation.
1951	The Ferranti Mark I, the first commercially manufactured computer, is installed at Manchester University in February.
	The first UNIVAC is delivered to the Census Bureau in March.
	Whirlwind, the first real-time computer, is completed.
	William Shockley invents the junction transistor.
	Grace Hopper conceives of an internal program known as a compiler.
1952	Thomas Watson, Jr., becomes president of IBM
	UNIVAC successfully predicts the outcome of the presidential election.
1953	IBM delivers the 701, its first electronic computer, to Los Alamos in March.
	MIT conducts a successful full-scale test of Jay W. Forrester's magnetic-core memory.
1954	IBM introduces the 650 medium-size computer in December.
1955	Remington Rand merges with Sperry Corp., forming Sperry Rand.
	Shockley establishes a semiconductor company in Mountain View, California.

Chronology of the History of Computers

1956	John McCarthy, an MIT computer scientist, coins the phrase "artificial intelligence."
1957	IBM introduces FORTRAN, the first high-level computer language.
	Philco Corporation introduces the Philco 2000, the first commercially available transistorized computer.
1958	The first SAGE direction center goes into operation at McGuire Air Force Base in New Jersey.
	Jack Kilby builds an integrated circuit (IC) at Texas Instruments in Dallas.
	Jean Hoerni devises the planar process for making transistors.
1959	Kurt Lehovec designs an IC whose components are isolated with pn junctions.
	Robert Noyce invents a planar IC, paving the way for the mass manufacture of reliable and efficient ICs.
1961	MIT develops the first computer time-sharing system.
	Texas Instruments builds the first IC computer.
1963	The Digital Equipment Corporation introduces the minicomputer.
	The Bell Punch Company, a British firm, offers electronic calculators using discrete components.
1964	IBM unveils the System/360, the first family of computers.
1968	Noyce and Gordon Moore establish Intel in Santa Clara, California.
	Intel introduces the first 1K random-access memory (RAM).
1971	Intel invents the microprocessor.
	Mass-produced pocket calculators are introduced in the U.S.
1973	The ENIAC patent is invalidated.
	IC computers become commonplace.
1974	An article describing the construction of a "personal minicomputer" appears in *Radio-Electronics*.
1975	The Altair computer premières in *Popular Electronics*, inaugurating the personal computer industry.
1977	The Apple II is introduced.
1981	IBM enters the personal computer market with the PC.
1984	IBM develops a one-million bit RAM.

DID YOU KNOW??

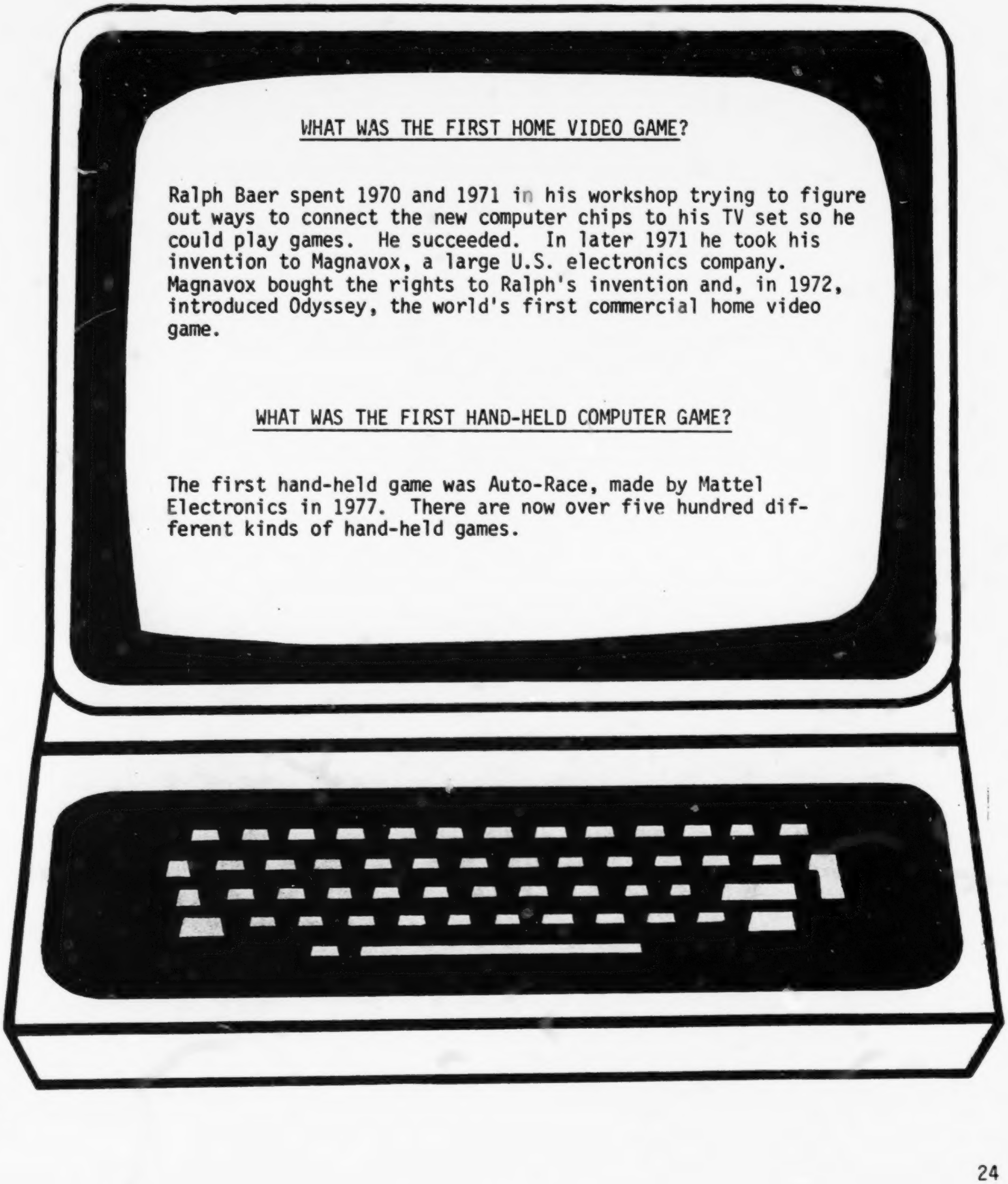


WHAT WAS THE FIRST COMPUTER GAME?

People probably began to secretly play games on computers when they were first invented, during the mid-1940s. But in the 1940s and 1950s, there were only a few dozen computers in the whole world, and most people thought computers were serious machines and should only be used to solve problems for science, business, and the military.

In 1962, Steve Russell, in Cambridge, Massachussets, invented a game called Spacewar. At first, the game was a secret, especially from Steve's bosses, who owned the computer. But the game was so exciting that people started calling Steve to get copies of Spacewar to play on their computers. Pretty soon, computers all over the country were playing Spacewar with human beings.

DID YOU KNOW??



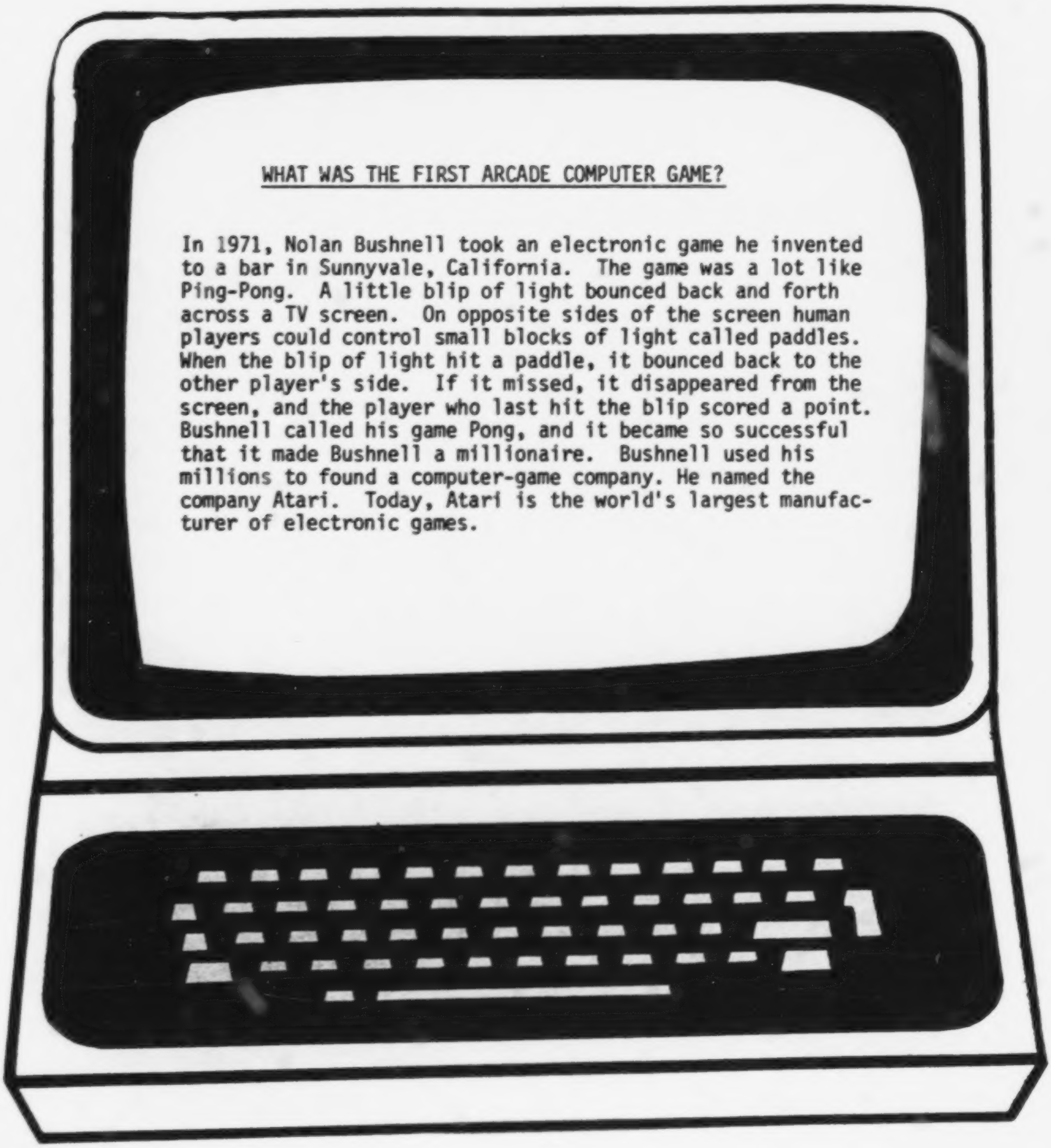
WHAT WAS THE FIRST HOME VIDEO GAME?

Ralph Baer spent 1970 and 1971 in his workshop trying to figure out ways to connect the new computer chips to his TV set so he could play games. He succeeded. In later 1971 he took his invention to Magnavox, a large U.S. electronics company. Magnavox bought the rights to Ralph's invention and, in 1972, introduced Odyssey, the world's first commercial home video game.

WHAT WAS THE FIRST HAND-HELD COMPUTER GAME?

The first hand-held game was Auto-Race, made by Mattel Electronics in 1977. There are now over five hundred different kinds of hand-held games.

DID YOU KNOW??



WHAT WAS THE FIRST ARCADE COMPUTER GAME?

In 1971, Nolan Bushnell took an electronic game he invented to a bar in Sunnyvale, California. The game was a lot like Ping-Pong. A little blip of light bounced back and forth across a TV screen. On opposite sides of the screen human players could control small blocks of light called paddles. When the blip of light hit a paddle, it bounced back to the other player's side. If it missed, it disappeared from the screen, and the player who last hit the blip scored a point. Bushnell called his game Pong, and it became so successful that it made Bushnell a millionaire. Bushnell used his millions to found a computer-game company. He named the company Atari. Today, Atari is the world's largest manufacturer of electronic games.

WORDS TO KNOW

Abacus - An ancient calculating device consisting of a wooden frame with rods on which beads are moved. Abacus comes from the Greek word "abax" which means "board, or calculating table."

Analog Computer - A computer that measures continuously changing conditions, such as temperature and pressure, and converts them into quantities.

Analytical Engine - A mechanical computing device designed but never completed by British scientist Charles Babbage in 1835.

Arithmetic Machine - A calculating machine that could add and subtract. It was invented by Blaise Pascal in 1642.

Babbage, Charles - A British scientist who developed and partially built the Analytical Engine, which was the forerunner of modern digital computers. Babbage is called the Father of Computers.

Binary Number System - A number system that used only two digits, 0 and 1.

Calculate - To determine something (an answer) by using a mathematical process.

Circuit - A path through which electricity flows.

Digital Computer - A general purpose computer that uses letters, numbers, and symbols as input and converts this information into digits to be stored and processed.

Eckert, J. Presper - An American engineer who, with John Mauchly, designed the ENIAC and UNIVAC computers.

Electromechanical - Made with both electric and mechanical (moving) parts.

ENIAC - An acronym for Electronic Numerical Integrator and Calculator. An electronic computer built in 1946.

Hollerith, Herman - An American engineer who designed the Tabulating Machine, which used punched cards to sort data from the 1890 census.

Integrated Circuit (IC) - An electrical pathway, made up of many transistors, that transmits electricity much faster than a single transistor. Integrated circuits were used in third-generation computers.

Integrated Circuit Chip (ICC) - A very tiny wafer of silicon containing thousands of integrated circuits. Chips are used in fourth-generation computers.

Jacquard, Joseph - A French weaver who, in 1801, designed a loom which used punched cards to store patterns that were woven into fabric.

Leibniz, Gottfried - A German scientist. Built a calculating device called the Stepped Reckoner.

Lovelace, Ada Augusta - Was called the first programmer. She was an English mathematician who assisted Charles Babbage in designing the Analytical Engine and who wrote about Babbage's work.

Mark I - The first electromechanical computer. Designed in 1944.

Napier's Bones - A set of numbered rods used for calculating. Invented by John Napier, a Scottish mathematician,in 1612.

Pascal, Blaise - Invented the Arithmetic Machine in 1642.

Punched Card - A paper card containing holes that stand for data or programs.

Stepped Reckoner - A calculating machine, invented by Gottfried Leibniz in 1694,that could add, subtract, multiply, and divide.

UNIVAC - An acronym for UNIVersal Automatic Computer It was the first commercial computer and designed in 1951.

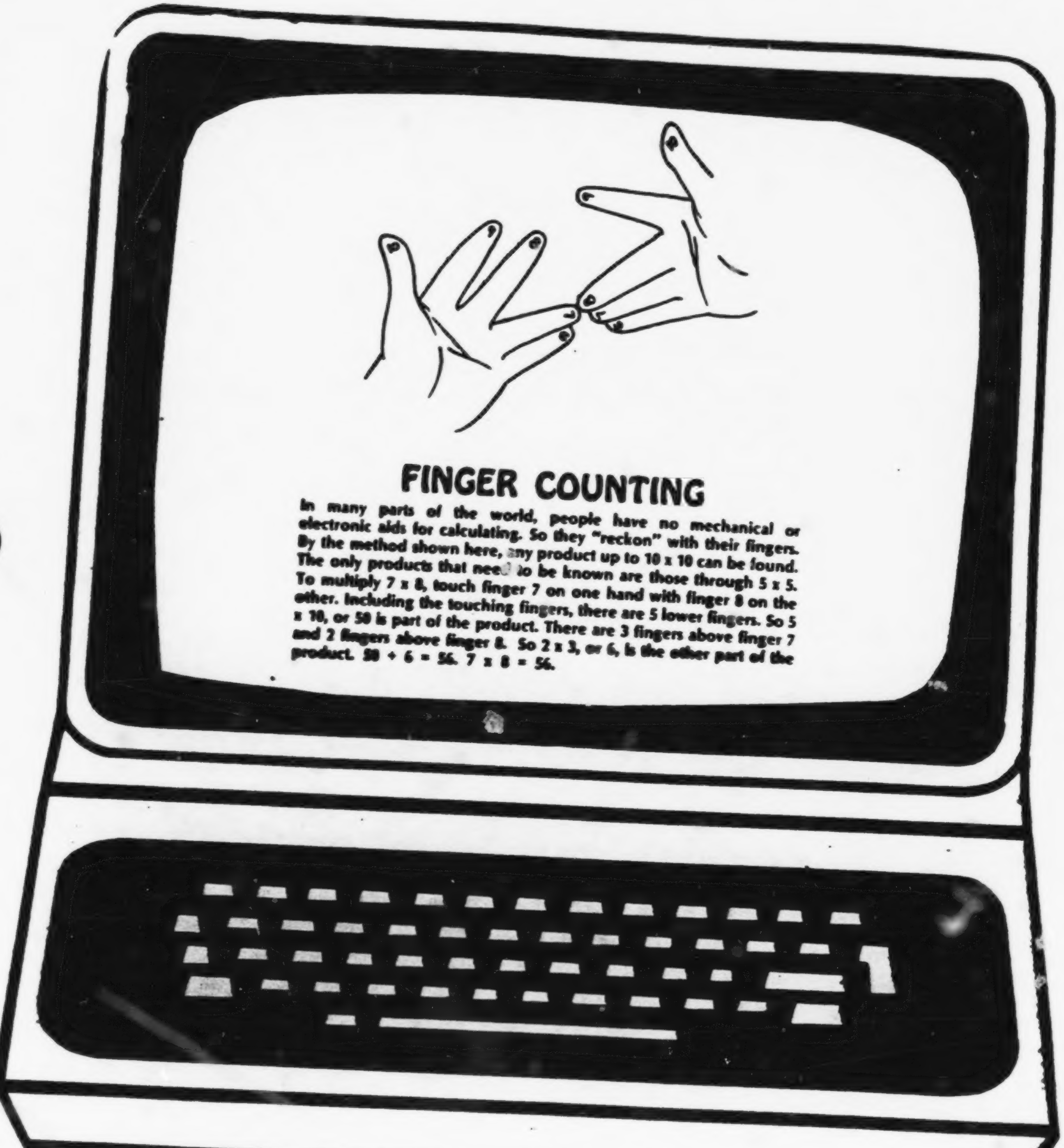
Vacuum Tube - A device used to transmit electricity in first-generation computers.

von Neumann, John - An American mathematician who introduced the idea of storing a program in first-generation computers.

THESE QUESTIONS WILL BE ON YOUR POSTTEST. CAN YOU ANSWER THEM NOW???

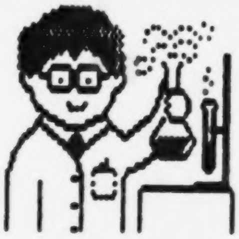
- One of the first tools used to express numbers was the:
    - a. Computer
    - b. Calculator
    - c. Abacus
    - d. Tabulating machine
- To calculate numbers, primitive people used:
    - a. Calculators
    - b. Adding machines
    - c. Pebbles and stones
    - d. Computers
- The father of computers was:
    - a. Pascal
    - b. Babbage
    - c. Hollerith
    - d. Jacquard
- The fastest computers are from what generation?
    - a. First
    - b. Second
    - c. Third
    - d. Fourth
- The first programmer was:
    - a. Hollerith
    - b. Lovelace
    - c. Babbage
    - d. Boole
- Napier's bones were:
    - a. A first generation computer
    - b. A primitive multiplication machine
    - c. Man's first aid to counting
    - d. The first adding machine
- The number system used by computers is the:
    - a. Binary system
    - b. Decimal number system
    - c. Metric system
    - d. Roman numeral system

DID YOU KNOW??



FINGER COUNTING

In many parts of the world, people have no mechanical or electronic aids for calculating. So they "reckon" with their fingers. By the method shown here, any product up to 10 x 10 can be found. The only products that need to be known are those through 5 x 5. To multiply 7 x 8, touch finger 7 on one hand with finger 8 on the other. Including the touching fingers, there are 5 lower fingers. So 5 x 10, or 50 is part of the product. There are 3 fingers above finger 7 and 2 fingers above finger 8. So 2 x 3, or 6, is the other part of the product. 50 + 6 = 56. 7 x 8 = 56.



ACTIVITY: NAPIER'S BONES

Materials:

- Heavy paper, 11" x 10"
- Black Marker
- Ruler
- Scissors

Instructions:

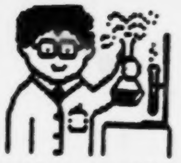
(1) Take the 11" x 10" paper and divide it into 1" squares. Make a set of bones like the pattern below.

(Each number written across the top is matched with the number written down the side so that the product obtained from multiplication of the two numbers is written in the square where the two meet.)

Example:

🔑	1	2	3	4	5	6	7	8	9
1	0/1	0/2	0/3	0/4	0/5	0/6	0/7	0/8	0/9
2	0/2	0/4	0/6	0/8	1/0	1/2	1/4	1/6	1/8
3	0/3	0/6	0/9	1/2	1/5	1/8	2/1	2/4	2/7
4	0/4	0/8	1/2	1/6	2/0	2/4	2/8	3/2	3/6
5	0/5	1/0	1/5	2/0	2/5	3/0	3/5	4/0	4/5
6	0/6	1/2	1/8	2/4	3/0	3/6	4/2	4/8	5/4
7	0/7	1/4	2/1	2/8	3/5	4/2	4/9	5/6	6/4
8	0/8	1/6	2/4	3/2	4/0	4/8	5/6	6/4	7/2
9	0/9	1/8	2/7	3/6	4/5	5/4	6/3	7/2	8/1

(2) Cut out each column on the sheet so that they might be handled separately for use in solving multiplication problems.

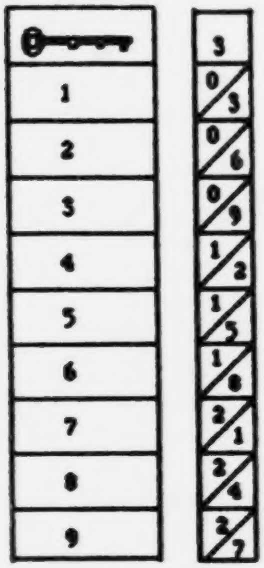


How to Use it:

(1) To solve one-digit multiplication problems with Napier's Bones:

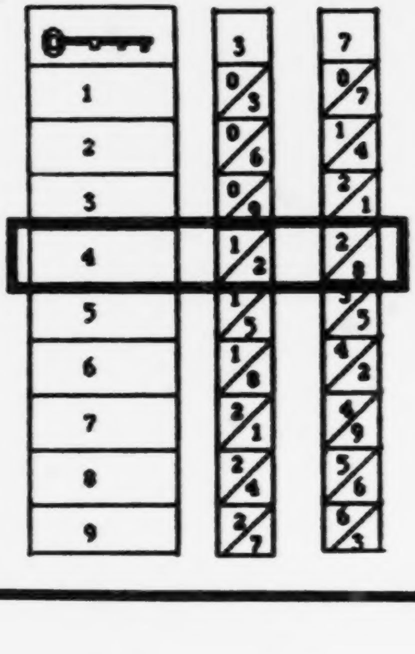
Line up the key card and the card for the number being multiplied.

Example: To multiply 5 x 3, line up the key and the 3 card. Move down the key card to 5 and then straightacross. You come to the answer 15.


3
1
0/3
2
0/6
3
0/9
4
1/2
5
1/5
6
1/8
7
2/1
8
2/4
9
2/7

(2) To solve multiplication problems with one two-digit number:

Example: To multiply 37 x 4, line up the key card, 3 card, and 7 card.


3
7
1
0/3
0/7
2
0/6
1/4
3
0/9
2/1
4
1/2
2/8
5
1/5
3/5
6
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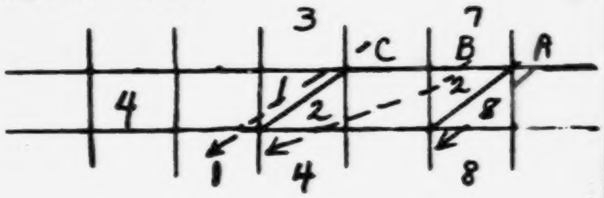
4/2
7
2/1
4/9
8
2/4
5/6
9
2/7
6/3


3
7
C
B
A
4
1
2
2
8
1
4
8

To get an answer, start at A and record the number there in the 1's place. At B we find two numbers in line, so they are added to get 4. The result of B will be placed in the 10's place. The answer for 37 x 4 is, then, 148.

(3) To solve the multiplication problems with two two-digit numbers:

🔑	3	7
1	0/3	0/7
2	0/6	1/4
3	0/9	2/1
4	1/2	2/8
5	1/5	3/5
6	1/8	4/2
7	2/1	4/9
8	2/4	5/6
9	2/7	6/3

Example: To multiply 37 x 25, work with the number in the 1's place (5) first.

Multiplying 37 x 5 will result in:

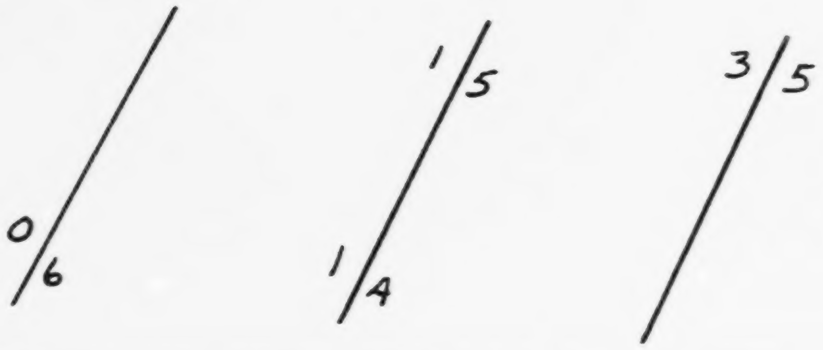
1/5 3/5

Multiplying 37 x 2 will result in:

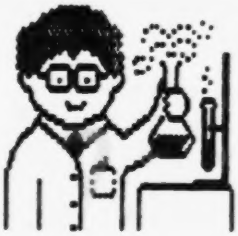
0/6 1/4

Line up the numbers to find the answer.

The 5 was in the 1's place and the 2 in the 10's place in the problem, so numbers must be lined up in this manner.



(6+1+1+1carried) 9 (5+3+4=12) 2 5 = 925

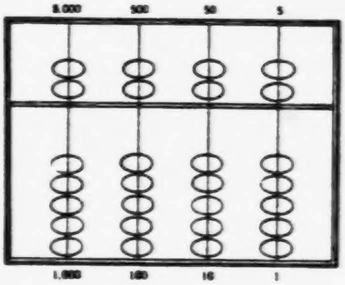


ACTIVITY: MAKING AN ABACUS

MATERIALS: Small box, string or yarn, tape, beads, glue, pencil or marker.

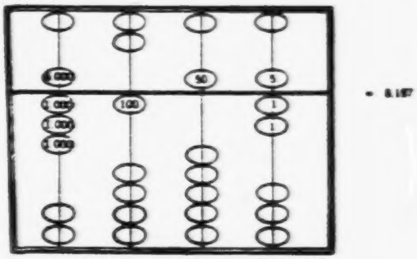
PROCEDURE:

1. Use the box lid for the center bar.
2. Push the lid into the box so it is perpendicular to the bottom and parallel to the sides. Trim excess. Glue it permanently into position.
3. Mark across the long side of box (top) four equal spots. Punch holes at each spot and also at corresponding spots on center bar and bottom side of box.
4. Wind tape around end of yarn to make needle. Pass yarn through top hole on left. Add two beads before threading yarn through center bar. Add five beads and then thread yarn through bottom hole. Continue back up through the next hole threading beads in same pattern as first row.
5. Tape the ends of yarn securely when threading is completed.



HOW TO USE IT:

1. All beads below the center bar represent the value of 1.
2. The two beads above the center bar each represent a value of 5.
3. The yarn wires represent place values of 10.
4. The first row of beads on the right represents the numbers 1-9. When another bead is added, the number becomes 10 and it is necessary to move a bead in the second row which represents tens.
5. The numbers in the next row are hundreds.
6. The numbers in the next row are thousands.



Numerical totals are read at the dividing bar

ACTIVITY: PUNCH CARD SURVEY (HISTORY OF HOLLERITH CARDS)

Skills Taught:	Introduction to the Punch Card
Materials:	Individual punch cards 3x5 cards or old IBM punch cards, scissors, knitting needle or large paper clips
Objective:	To introduce the idea that punch cards are a useful tool for collecting data and sorting data. Some computers organize data using punch cards.

Preparation of Cards: Using a hole punch, punch a row of 6 rows along one side of the card. Number the holes 1-9.

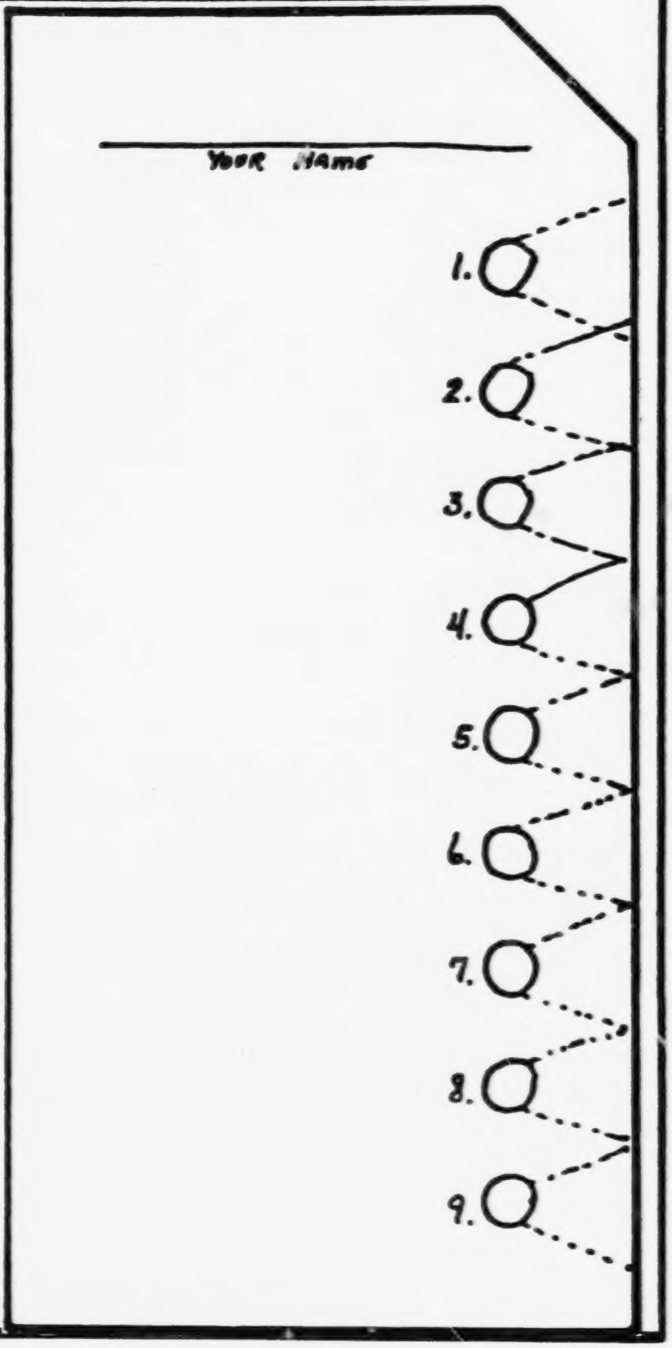
Procedure: As the teacher asks the following questions, the students cuts open the hole to the outside edge if the answer is No. (Student puts his/her name in the center of the card.)

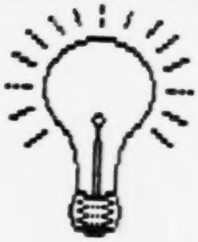
Questions can be about any topic:

1. Are you a male?
2. Were you born in Texas?
3. Is your favorite sport soccer?
4. Is your favorite food pizza?
5. Do you have sisters and brothers?
6. Do you own a computer?

etc.

After the survey is completed, stack the cards with the names up. Poke the knitting needle or extended paper clip through the first hole and shake out the loose cards. The cards still on the needle will be the male cards. Continue this process with each hole and record information on chart or chalkboard.





ADDITIONAL ACTIVITIES - HISTORY OF COMPUTERS

Create an abacus and demonstrate its use to the class. Invite a person from the local Chinese community (or a Chinese restaurant) to demonstrate an abacus.

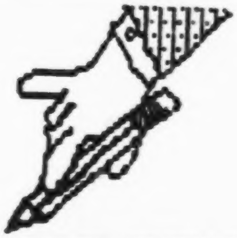
Using a world map, identify places where significant events in computing history took place.

Invite a computer representative from IBM, UNIVAC, or a similar company and learn about the history of that company's computers and about its future plans for computers.

Write a report (using library books, etc.) on one of the important persons in computer history.

What will the Fifth Generation of computers be like. Why are they called knowledge processors instead of data processors? How will they differ from the Fourth Generation machines?

If anyone has visited the EPCOT Center at Walt Disney World in Florida, have them report about EPCOT's uses of computers in the future.



COMPUTER HISTORY

P	K	V	P	M	S	S	P	A	S	C	A	L	W	E	L	P	D	P	R
T	W	D	C	S	Q	E	R	W	Z	Y	G	Y	V	X	T	X	Z	H	Z
B	R	G	H	W	T	U	B	O	O	J	W	I	N	L	B	C	I	X	V
P	K	H	U	B	B	Q	Q	U	T	C	S	R	H	B	A	U	N	R	R
Z	Z	Y	L	H	E	V	E	M	T	S	Q	D	L	U	B	R	B	V	I
N	D	P	P	D	O	M	F	W	A	M	I	V	C	C	B	Z	I	Q	T
O	S	S	B	R	Y	L	J	M	X	S	U	S	C	F	A	H	E	W	O
N	Y	J	F	X	I	S	L	O	O	U	I	U	N	V	G	X	L	Z	W
B	V	O	K	Q	S	N	E	E	S	M	U	F	C	A	E	U	O	F	Z
R	E	I	P	A	N	L	T	N	R	D	G	C	M	A	R	T	D	U	C
A	N	W	D	D	E	E	I	E	O	I	R	C	N	P	V	T	Y	A	I
F	I	O	O	Z	B	V	C	D	R	B	T	A	C	Y	E	J	V	T	K
N	A	R	T	R	O	F	G	N	E	C	S	H	U	C	B	I	B	W	R
U	C	H	F	N	I	X	L	U	R	R	I	R	T	Q	N	R	Y	V	A
N	A	N	O	S	E	C	O	N	D	S	U	R	E	U	C	L	O	A	M
D	Z	A	L	A	V	K	B	R	U	Q	I	L	C	I	T	A	R	B	L
F	I	N	G	E	R	S	I	X	M	K	P	K	E	U	P	H	J	A	Q
G	Y	Z	Z	Y	J	V	U	A	O	C	M	Z	M	K	I	A	W	C	V
F	L	E	G	U	M	R	R	Z	W	D	H	K	D	V	B	T	N	U	J
Z	X	E	E	O	N	X	L	M	T	Y	L	Z	I	I	T	O	S	S	R

THERE ARE 20 WORDS HERE--CAN YOU FIND THEM?

1. Find the names of seven inventors
   Pascal Babbage Napier Aiken Leibniz
   Hollerith Jacquard

2. Find the names of three early computers
   Mark I UNIVAC ENIAC

3. Find the names of four early computing devices
   Fingers Napiers Bones Slide rule Abacus

4. Find two characteristics of first generation computer
   vacuum tubes massive

5. Find two characteristics of second generation computers
   transistors FORTRAN

6. Find two characteristics of third generation computers
   printer circuits nanoseconds

USE OF COMPUTERS-
NOW AND IN THE FUTURE

TEA's

ESSENTIAL ELEMENT

COMPUTER USE

A. List the uses of computers in a variety of situations.

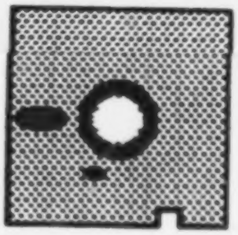
1. Describe computer applications in the following areas: Business, education, home, transportation, government and politics, health, crime prevention control, arts, humanities, sports, games, science, engineering, and research.

2. Explain ways computers are used in everyday life.

B. Understand advantages and disadvantages of using computers.

1. List computer attributes that make them unique tools: Speed, accuracy, performing repetitive tasks, making logical decisions, programmability, performing arithmetical functions, manipulating data sets.

2. Describe attributes which can limit a computer's usefulness: Cost availability of software, storage capacity, ease of use, limitations in higher order, thinking, inability to synthesize information, inability to originate new ideas.



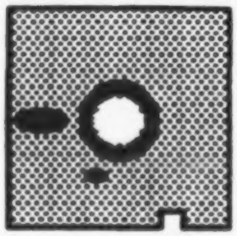
COMPUTERS ARE EVERYWHERE -- AND A PART OF OUR FUTURE

Computers affect our lives everyday in many ways. Today's computers aren't smart in the same way that people are considered to be smart, but today's computers are much more capable than the early computers. In the future, computers will become faster, and make even more decisions regarding input information.

Currently the computer industry is adding what we might call "intelligence" to various devices. This is done by microprocessors which can, for instance in a car, signal the driver when the oil pressure is low, how much gas is left in the gas tank, and whether the brake has been released.

In some homes, computers are saving energy and money by controlling heating and cooling systems, lights, and other devices. For example, some microwave ovens have microprocessors built-in that know exactly how long a certain food needs to be cooked and at the right temperature.

It is predicted that the job market will change due to computers. Teachers will program computers to teach individual students and people will use intelligent doctor machines to monitor their health without going to a doctor's office. Most people will do their shopping at home; while the computer screen displays the products, you will enter what purchase you want using the keyboard. The store will then deliver what you bought and the store's computer will send you the bill.



COMMON COMPUTER USES

- IN GOVERNMMENT.

The United States government was one of the first computer users. During World War II, the government designed computers to crack the enemy's secret military codes. Today, the military forces use computers for tasks such as tracking and guiding aircraft, ocean vessels, and tanks, and for planning defense strategies. They also use computers to keep records of people that are in the military -- their rank, jobs, pay, and other important information.

The Census Bureau uses computers to sort the information it receives every ten years on every person in the United States.

The Internal Revenue Service (IRS) uses computers to keep records of tax forms and check them for errors. Computers print out checks for people who get refunds. Computers also print out notices to people who still owe taxes.

State and local governments also rely on computers to get jobs done. For example, states keep records of all cars, trucks, and other vehicles owned by people. Some cities have their traffic lights timed by a computer.

- IN THE SPACE PROGRAM.

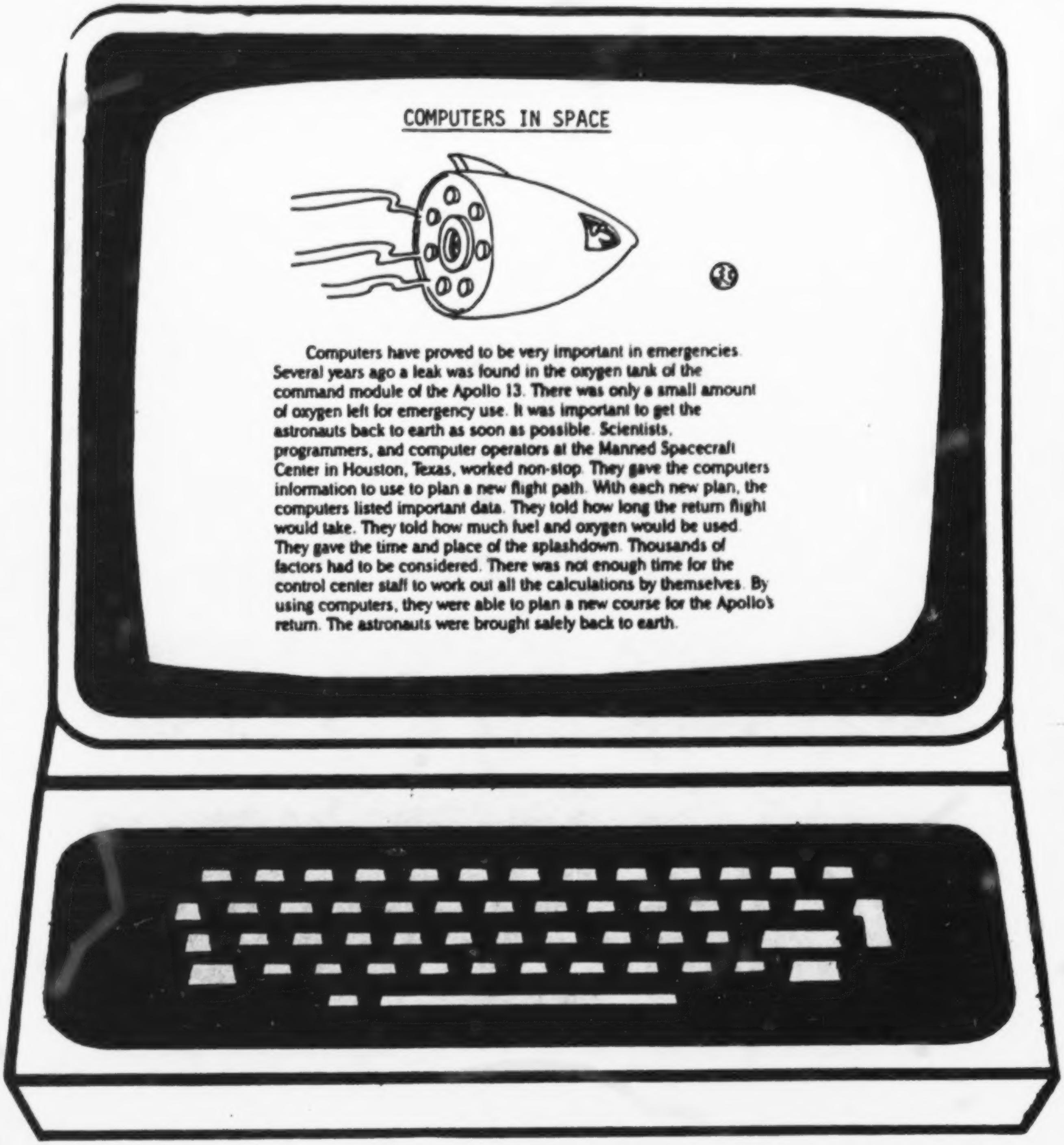
Spaceships wouldn't get off the ground if it weren't for computers. From the launching of the first spaceship in 1959, computers have been used for space flights. They have helped plan the path of spaceships. They have been used to keep the ships on course and plan their landing.

- IN OFFICES.

Large companies use computers to keep track of customers' accounts and prepare their bills. Computers not only work faster, they are more accurate.

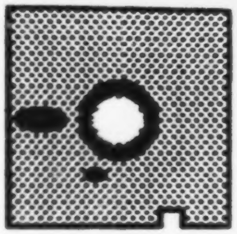
In most large companies, computers prepare paychecks and keep payroll records. They keep track of inventory and accounts. Computers also process data to give estimates of how much money a company might make at a future date.

DID YOU KNOW??



COMPUTERS IN SPACE

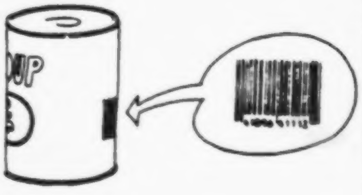
Computers have proved to be very important in emergencies. Several years ago a leak was found in the oxygen tank of the command module of the Apollo 13. There was only a small amount of oxygen left for emergency use. It was important to get the astronauts back to earth as soon as possible. Scientists, programmers, and computer operators at the Manned Spacecraft Center in Houston, Texas, worked non-stop. They gave the computers information to use to plan a new flight path. With each new plan, the computers listed important data. They told how long the return flight would take. They told how much fuel and oxygen would be used. They gave the time and place of the splashdown. Thousands of factors had to be considered. There was not enough time for the control center staff to work out all the calculations by themselves. By using computers, they were able to plan a new course for the Apollo's return. The astronauts were brought safely back to earth.



- IN SUPERMARKETS.

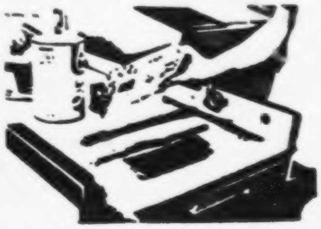
Many supermarkets are using a Universal Product Code computer system.

Today, almost all packaged products are marked with a set of black and white bars and numbers. This symbol is called the Universal Product Code, or UPC.

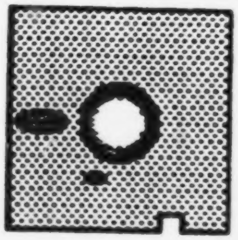


The first few bars and numbers in the UPC usually represent the name of the manufacturer and the product. The remaining bars represent the size of the product.

When the UPC is passed over the bar-code scanner ("window") on the checkout counter, the code is "read" by the store's computer. The computer is usually not near the cash register. It might be in an office in another part of the store. It is connected to the cash registers by cables under the floor. The computer translates the code into the product name, size, and price. Then, it sends that data back to the cash register, which prints it on the register tape. The computer also computes the tax, if any, on each item. All this happens in less than a second. This is faster than having the cashier ring up each price. When all the items have been entered, the computer calculates the total bill. It sends the total to the cash register in less than a second. Using the UPC system makes the checkout time go much faster.

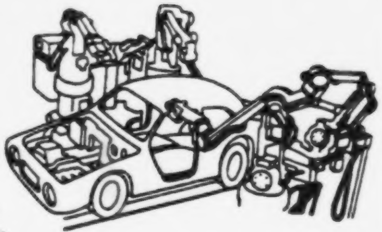


Universal Product Codes save the supermarkets a lot of time, too. Since the packaged products already have a code on them, the store clerks do not have to stamp prices on every item. Some stores post prices on the shelves. A UPC system also keeps better track of the store's inventory. Each time the computer reads a UPC code, the records stored in its memory are changed. They show one fewer item remaining in the store. This is much faster and more accurate than counting items left on the shelves at the end of the day.



- IN FACTORIES.

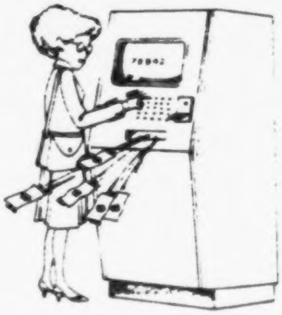
Robots do many dangerous jobs in factories. They work in very hot or cold or polluted environments. Robots are also used for tasks that must be done over and over again. This allows factory workers to spend more time on jobs that require human skills and intelligence.



A robot is a computer that has been programmed to do certain tasks. Some robots are "arms" with many "fingers" that perform delicate tasks. Other robots look like large boxes which move around. They deliver machine parts to stations along their computerized routes. Robots neither look nor act like humans. But there will be more and more of them working next to people in factories.

- IN BANKS.

All across the country, banks are installing computerized automatic tellers. They allow customers to withdraw cash, make deposits, and pay bills any time of the day or night.

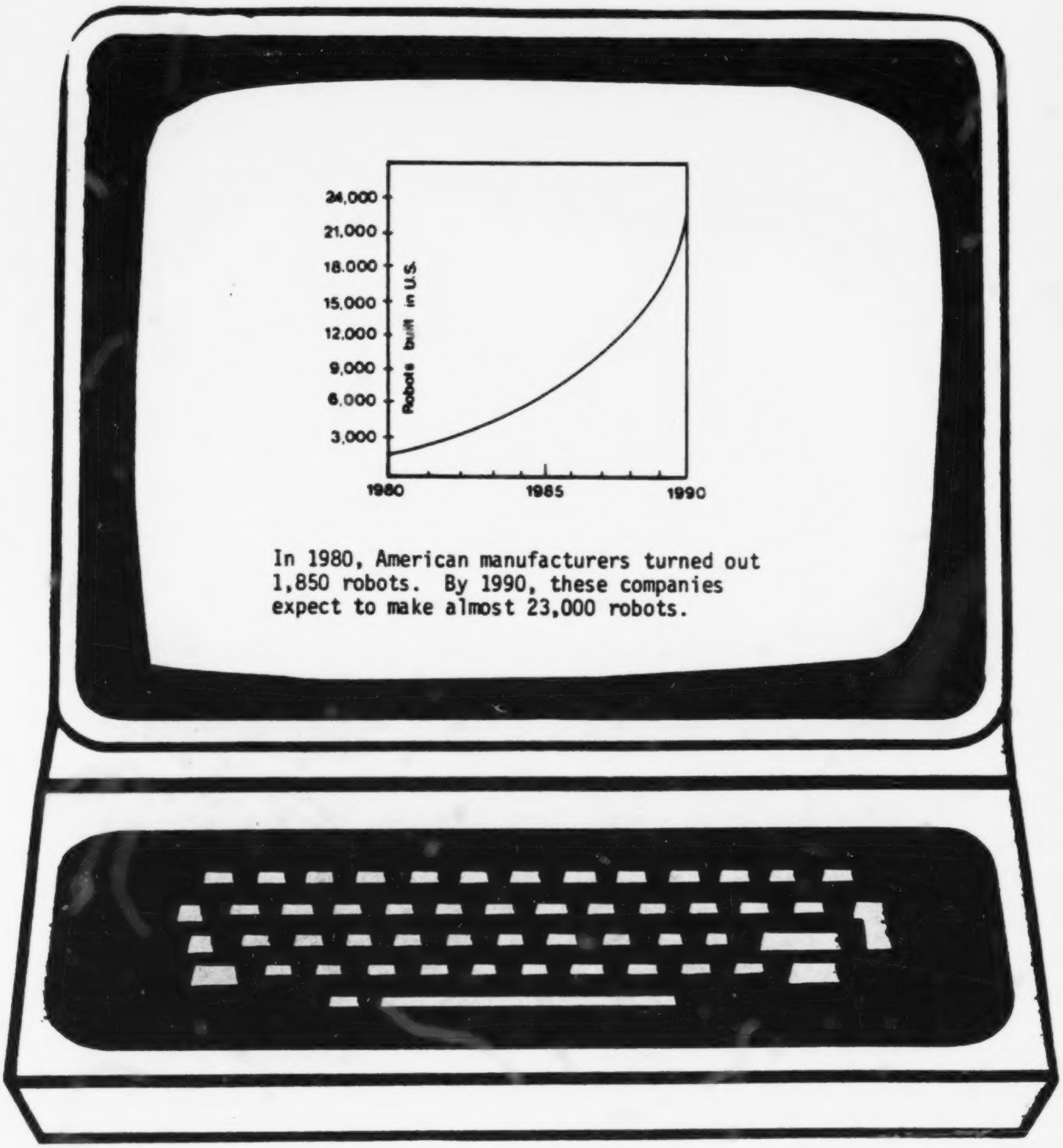


Banks also use computers to keep track of checking and savings accounts. Bank checks have account numbers printed on them in magnetic ink. An input device called a Magnetic Ink Character Reader reads the numbers on the check.

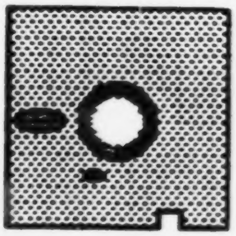
Each month, the computer prints a list of checks cashed, deposits made, and the balance.

Banks use computers for many other things, too. They compute interest on loans and savings accounts. They keep track of how much money a bank is able to lend. They also compute how much money a bank may have at a given moment. There is so much activity in a bank that it would be impossible to keep records without computers.

DID YOU KNOW??



In 1980, American manufacturers turned out 1,850 robots. By 1990, these companies expect to make almost 23,000 robots.



- IN HOSPITALS.

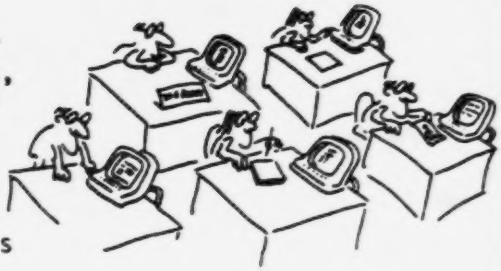
Computers are used in many places in hospitals to monitor patients. In the operating room, computers flash information about a patient's blood pressure, heart rate, and temperature on a screen. A warning signal sounds if there is any problem. Computerized X-ray machines can take very detailed pictures. They allow doctors to see things that would not show up on ordinary X-rays. Computers also help interpret the results of laboratory tests.

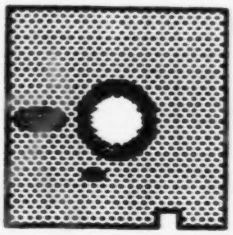
Computers help the hospital staff gather information and interpret results. Will computers ever take over the roles of doctors, nurses, and other hospital personnel? No. Human judgment will always be necessary and desirable when treating people.

- IN NEWSPAPERS.

Today, many newspaper reporters use computer terminals. As they type on silent keyboards, their stories appear on video screens. They use a computer program that does word processing.

When the story is ready, the reporter types an instruction to store it in the newspaper's main computer. When all the stories are ready, the computer prints out each one. The stories fit neatly in columns.





- IN SCHOOLS.

Using computers to help students learn is called Computer Assisted Instruction, or CAI.

A computer is very patient. It does not mind if you take a long time to answer a question. The computer will tell you immediately if your answer is correct or not. No waiting until the next day to get your score.

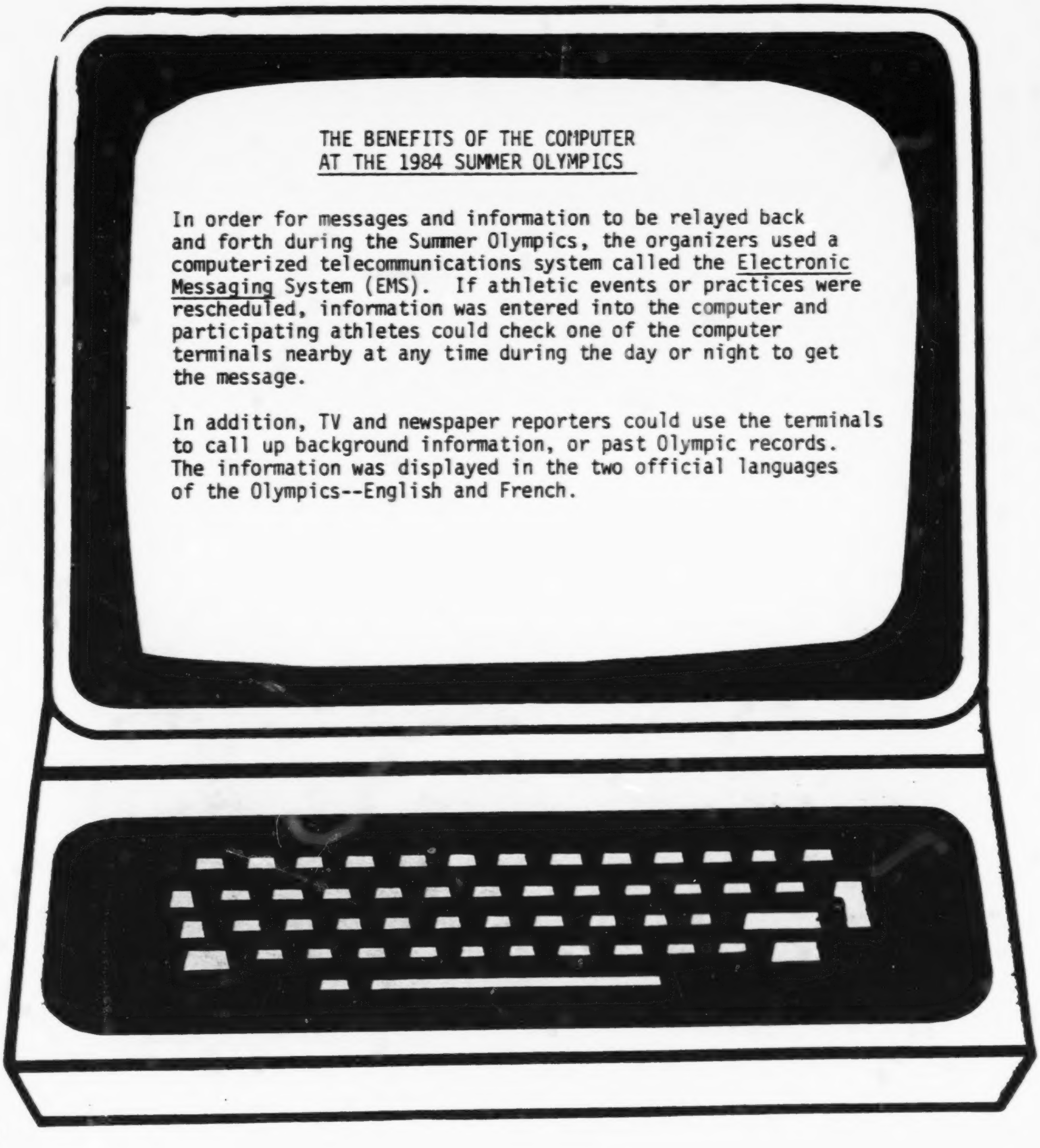
However, a computer can't take over the role of a teacher. It doesn't explain things in different ways. You can't ask it any question. Your answer must be exactly right, or the computer will count it wrong.

- IN YOUR HOME.

Some people have computers in their homes. They may use them to keep family records such as taxes and bank accounts. They may use them to store records such as important dates or recipes. Many people use their home computers to play games or to learn how to write programs.

Some day computers might be as common as televisions in homes. They will be used to store information such as phone numbers, addresses, appointments, and bank accounts. They will probably be connected to mainframe computers outside the home. This will let people communicate with stores, banks, and news services.

DID YOU KNOW??

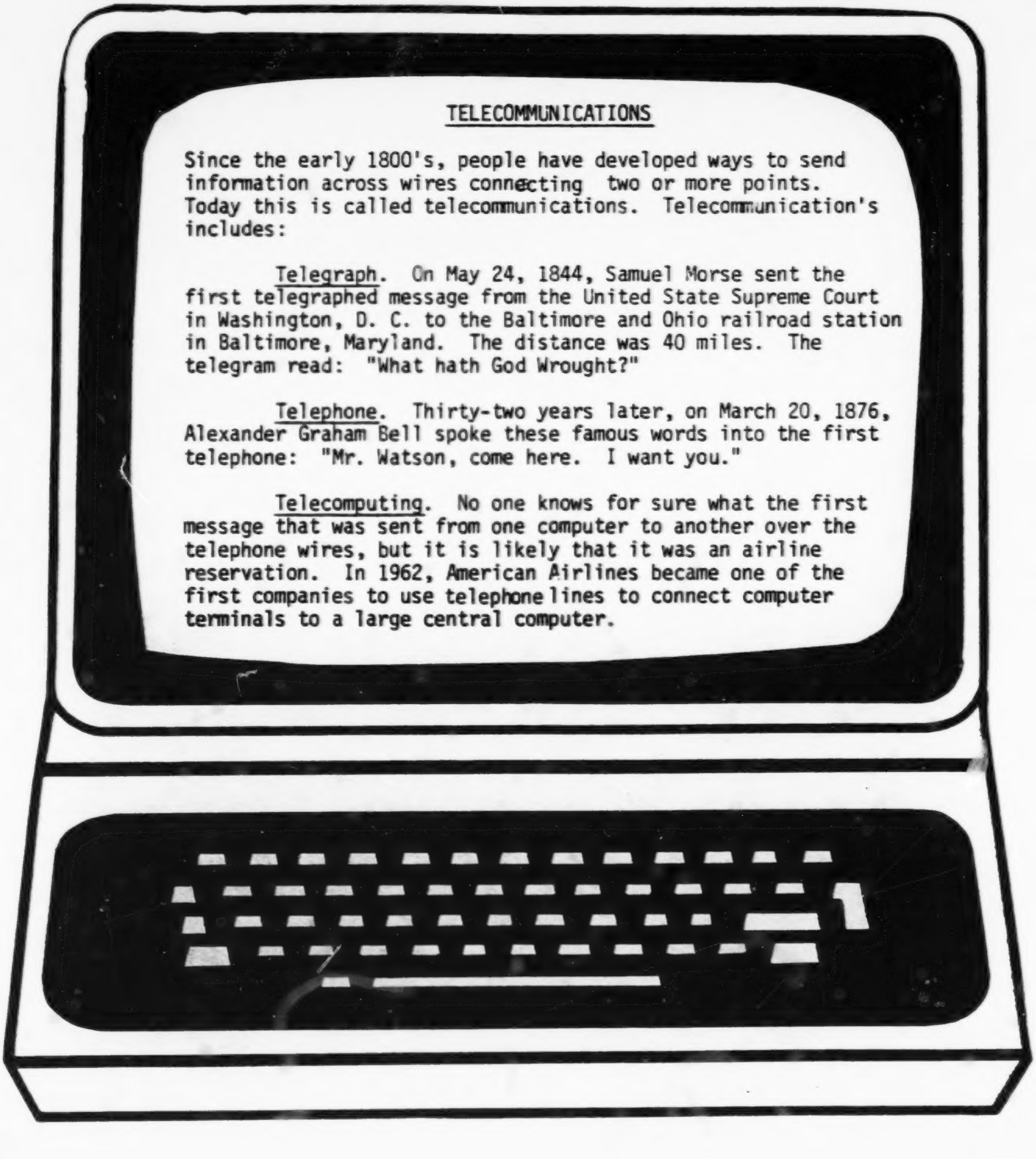


THE BENEFITS OF THE COMPUTER AT THE 1984 SUMMER OLYMPICS

In order for messages and information to be relayed back and forth during the Summer Olympics, the organizers used a computerized telecommunications system called the Electronic Messaging System (EMS). If athletic events or practices were rescheduled, information was entered into the computer and participating athletes could check one of the computer terminals nearby at any time during the day or night to get the message.

In addition, TV and newspaper reporters could use the terminals to call up background information, or past Olympic records. The information was displayed in the two official languages of the Olympics--English and French.

DID YOU KNOW??



TELECOMMUNICATIONS

Since the early 1800's, people have developed ways to send information across wires connecting two or more points. Today this is called telecommunications. Telecommunication's includes:

Telegraph. On May 24, 1844, Samuel Morse sent the first telegraphed message from the United State Supreme Court in Washington, D. C. to the Baltimore and Ohio railroad station in Baltimore, Maryland. The distance was 40 miles. The telegram read: "What hath God Wrought?"

Telephone. Thirty-two years later, on March 20, 1876, Alexander Graham Bell spoke these famous words into the first telephone: "Mr. Watson, come here. I want you."

Telecomputing. No one knows for sure what the first message that was sent from one computer to another over the telephone wires, but it is likely that it was an airline reservation. In 1962, American Airlines became one of the first companies to use telephone lines to connect computer terminals to a large central computer.

IS THERE A COMPUTER IN YOUR HOME?

Think, for a moment, what a computer is. It's a machine that can accept, store, process, and give out information. Remember, the memory stores information. The central processing unit processes the information. The memory and CPU are integrated circuit chips. Do you think you have any of these chips in your house? You probably do. Do you have a digital clock or watch? An electronic game? A microwave oven with a "memory?" A new color television? A new car? A sewing machine that can be programmed? A push-button telephone? A calculator? All of these items contain computer chips. They usually have a memory chip and a CPU chip. The input units are the buttons, dials, and switches you use to operate these appliances. The output units are display screens such as the numbers on your digital watch. They are also electronic signals such as the telephone connection you make with your friend in another city.

Make a list of the types of "computers" you have in your house.

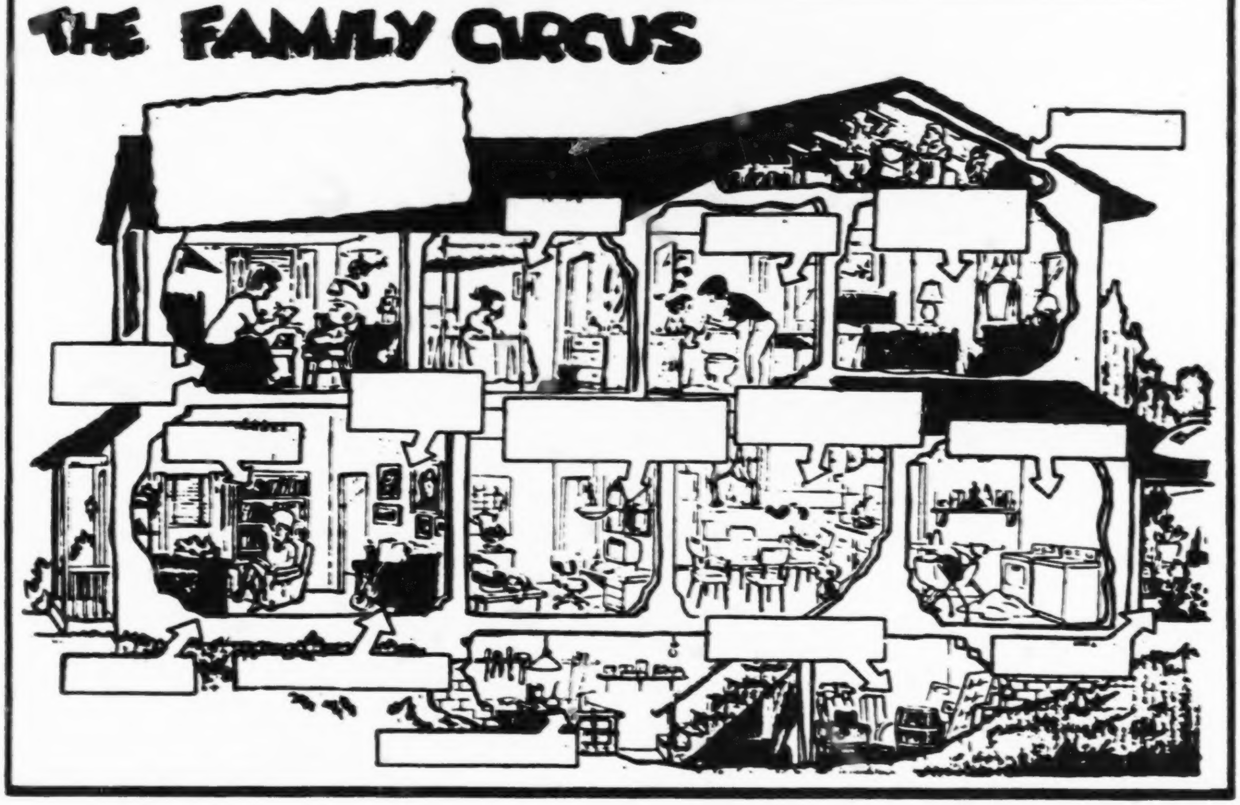
_______________ _______________

_______________ _______________

_______________ _______________

_______________ _______________

_______________ _______________



COMPUTER USE

AND

PROBLEMS IN OUR

SOCIETY

TEA's
ESSENTIAL ELEMENT

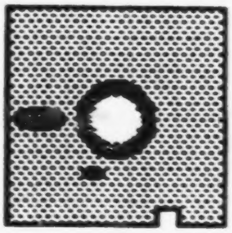
PROBLEMS AND ISSUES OF COMPUTER USE IN SOCIETY

A. Identify the importance of ethics in accessing and manipulating automated information.

   1. Describe the examples of computer fraud and misuse.
   2. Describe factors in maintaining security in an automated environment.
   3. Explain issues related to safeguarding individual privacy.

B. Identify the legal issues and potential solutions pertaining to computer use.

   1. Describe examples and problems associated with computer related law.
   2. Describe copyright issues as they relate to computer software.
   3. Identify issues related to crime and computer use.



From now on, computers will play a larger and more important role in our society. Hopefully, the role of the computer in our society will be good and beneficial.

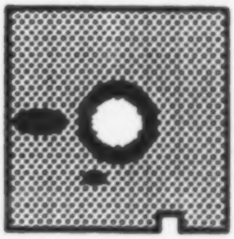
Recent surveys indicate that -

- we believe computers will improve education and law enforcement.
- we cannot escape the influence of computers.

When should the misuse of a computer be considered a crime? How can the information stored in computer systems be better protected? What is the difference between proper and improper use of computers?

Computer Laws -

By the end of 1983, 21 states had computer-crime laws. The U. S. Congress has also been debating a bill called the Federal Computer Systems Protection Act of 1983. The bill would make it a federal crime to tamper with certain computers. The law would also make it a crime in the United States to steal information from a federal-government computer or to alter or destroy information in such a computer "for personal gain."



STATISTICAL RESULTS OF SURVEY OF PUBLIC ATTITUDES TOWARDS COMPUTERS IN SOCIETY

	ADULT (N=300)		YOUTH (N=643)	
	Strongly or Mostly Agree	*Strongly or Mostly Disagree*	*Strongly or Mostly Agree*	*Strongly or Mostly Disagree*
Computer Impact on the Quality of Life				
• Computers will improve education.	86.6%	5.9%	84.2%	4.5%
• Computers will improve law enforcement.	81.9	3.3	70.0	10.1
• Computers will improve health care.	78.6	5.3	54.1	11.9
• Credit rating data banks are a worthwhile use of computers.	64.2	13.4	64.0	7.6
Computer Threat to Society				
• A person today cannot escape the influence of computers.	91.6	4.0	66.6	17.7
• Computer polls and predictions influence the outcome of elections.	48.1	27.5	44.2	26.9
• Computers dehumanize society by treating everyone as a number.	37.4	50.3	39.9	30.6
• Computers isolate people by preventing normal social interactions among users.	18.7	62.5	20.9	42.5
Understanding the Role of Computers				
• Computers are best suited for doing repetitive, monotonous tasks.	80.0	10.3	57.0	21.6
• Computers are a tool just like a hammer or lathe.	72.6	14.7	61.3	23.4
• Computers slow down and complicate simple business operations.	17.6	66.4	17.4	68.8
• Computers will replace low-skill jobs and create jobs needing specialized training.	71.0	15.0	61.8	14.4
• Computers will create as many jobs as they eliminate.	62.5	16.4	40.0	29.1
Understanding of Computers				
• Computers are beyond the understanding of the typical person.	25.2	61.6	30.6	49.2
• Computers make mistakes at least 10% of the time.	9.6	76.7	10.3	60.0
• Programmers and operators make mistakes, but computers are, for the most part, error free.	67.0	19.3	72.3	13.3
• It is possible to design computer systems which protect the privacy of data.	60.2	26.4	48.6	15.9

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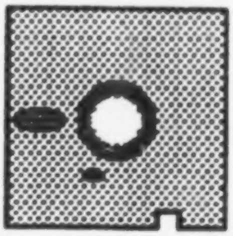


COMPUTER MISUSES

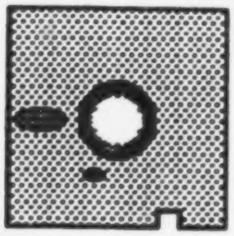
Computer Crime

Computer crime is one of the fastest growing areas of crime, and crimes committed using computers are among the hardest to solve.

Computer crime is usually a felony and is punishable in some states by up to 15 years in jail, a $50,000 fine, or both.

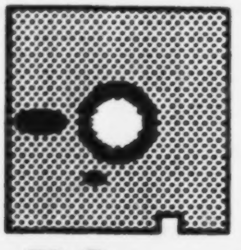
There are five main types of computer crime: financial fraud, information theft, pirating, unauthorized use of computer services, and vandalism.

Computer Crime	What Is It?
Financial Fraud	It involves using a company's computer to steal money from the company or from the company's customers. (For example, a person who has access to a bank's computer might set up a fake bank account and have the computer transfer money into it from customer accounts that are not used very often.)
Information Theft	There is a lot of information stored in computers throughout the United States. Much of this information is confidential information and some people will pay a high price for access to it.
Pirating	This is really a type of information theft. Pirating involves the copy and sale of software that is protected by law from being copied. Copying software programs or games is theft because the owner loses money when illegal copies of the program are made and sold.



Computer Crime	What Is It?
Illegal Use of Computer Services (Time)	Illegal use of computer time usually happens in companies that purchase time on a large computer system. Criminals who know the code word can access the computer system and do personal work for free while the company has to pay for it.
Vandalism	Computer vandalism is when the information in a computer system or the system (the equipment) itself is destroyed.

Computer crime prevention is extremely expensive and time-consuming. Only a few companies can really afford good crime prevention programs.



Credit Card Crooks

In Brooklyn, New York, there is a certain stretch of one street that is now known as Mugger's Alley. On this particular street there stands a bank computer that serves as a 24-hour-a-day cash dispenser. The customer sticks his credit card into the machine and the machine forks over a folderful of money. Then a mugger sticks his gun into the customer's back and the customer forks over the money to the mugger.

This is one example of credit card thievery. But it is by no means the only type that can occur, nor is it the most serious kind of credit card crime. Instead, picture this scene from the very near future: A new breed of electronic mugger eliminates the middleman (the credit card customer) and mugs the computer itself – electronically bypassing the various checkpoints and making the cash machine regurgitate money until it is empty. It would be the proverbial perfect crime: thousands would be stolen and there would be no witnesses, no evidence and no documentation. It may have happened already. The technology for cleaning out a money machine is known, and for an electrical engineer, it is neither difficult nor costly.

BANKAMERICARD
master charge
USE OUR
NO FINANCE CHARGE
90 DAY CASH PLAN
MOST MAJOR CREDIT CARDS
ACCEPTED
OPEN DAILY 9-9
SAT. TILL 6
BANKAMERIC
Just Say...
"Charge it!"
master char
JUST SAY
CHARGE IT!

If this sophisticated kind of bank robbery has actually ever occurred either no one knows about it or no one is talking about it. Banks and computer manufacturers are working feverishly to prevent such grand larceny from taking place, but they have yet to find a way to enforce security economically.

The only solution they have come up with is the magnetic stripe, a black line on the back of many credit and charge cards. The composition of that stripe is similar to the sensitive surface of sound-recording tape. Instead of recording sounds, however, the "mag stripe" records various bits of information about the card and its holder, encoded for reading by a computer terminal for transmission to a central computer. In much the same way that a playback head on a tape recorder picks up and transmits the sounds recorded on the tape, a "reader" picks up and transmits the data encoded on a mag stripe to a centrally located computer which runs a check on the card and sends back either an all clear or a warning signal. The entire process takes only a few seconds to complete. Security provided by a mag stripe is not only quick and convenient, it also thwarts the major techniques of today's credit card thieves – stolen and altered cards.

As we move into a society that bases its money handling less and less on cash transactions and more upon computerized techniques of transferring funds, there seems to be even greater reason to fear electronic robbery. Experts, however, are optimistic about the future. They cite how computers, even now, help security people to spot trends and patterns in the fraudulent use of credit cards. Thus, while increased utilization of electronics and of data processing may open some avenues for a new breed of sophisticated criminal, it may also help to close off some escape routes. The crook who manages to mug a computer could be caught by that computer.

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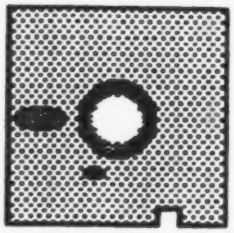
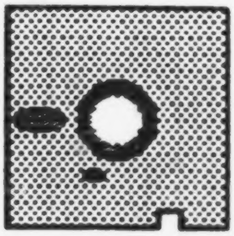


COMPUTERS, PRIVACY, AND THE LAW

Today more and more personal information about us is stored in many different computer systems.

At the present time, there are more than 5,000 data base systems in the federal government and more than 215 billion records. Data base is the term used to describe an efficient way of storing information for use by computers. A data bank is a large collection of information stored in a computer's storage system.

Laws, such as the Freedom of Information Act, make information in federal computer systems available to the public. Other laws have been passed to protect individuals' rights to information about themselves stored in computer systems--such as personal credit information and personal privacy.



A SUMMARY OF THE PRIVACY ACT OF 1974

H. R. 16373 prescribes legislative guidelines within the framework of the Freedom of Information Act (5 U.S.C. 552) to protect the privacy of individuals by regulating the Federal Government's collection, maintenance, use, or dissemination of personal, identifiable information.

In summary, the bill:

1. Permits an individual to have access to records containing personal information on him kept by Federal agencies for purposes of inspection, copying, supplementation and correction (with certain exceptions, including law enforcement and national security records).

2. Allows an individual to control the transfer of personal information about him from one Federal agency to another for nonroutine purposes by requiring his prior written consent.

3. Makes known to the American public the existence and characteristics of all personal information systems kept by every Federal agency.

4. Prohibits the maintenance by Federal agencies of any records concerning the political and religious beliefs of individuals unless expressly authorized by law or an individual himself.

5. Limits availability of records containing personal information to agency employees who need access to them in performance of their duties.

6. Requires agencies to keep an accurate accounting of transfers of personal records to other agencies and outsiders and make such an accounting available, with certain exceptions to the individual upon his request.

7. Requires agencies, through formal rulemaking, to list and describe routine transfers and establish procedures for access by individuals to records about themselves, amending records, handling medical information, and charging fees for copies of documents.

8. Makes it incumbent upon an agency to keep records with such accuracy, relevance, timeliness and completeness as is reasonably necessary to assure fairness to the individual in making determinations about him.

9. Provides a civil remedy by individuals who have been denied access to their records or whose records have been kept or used in contravention of the requirements of the act. The complainant may recover actual damages and costs and attorney fees if the agency's infraction was willful, arbitrary, or capricious.

10. Makes unlawful possession or disclosure of individually identifiable information by a government employee punishable by a fine not to exceed $5,000.

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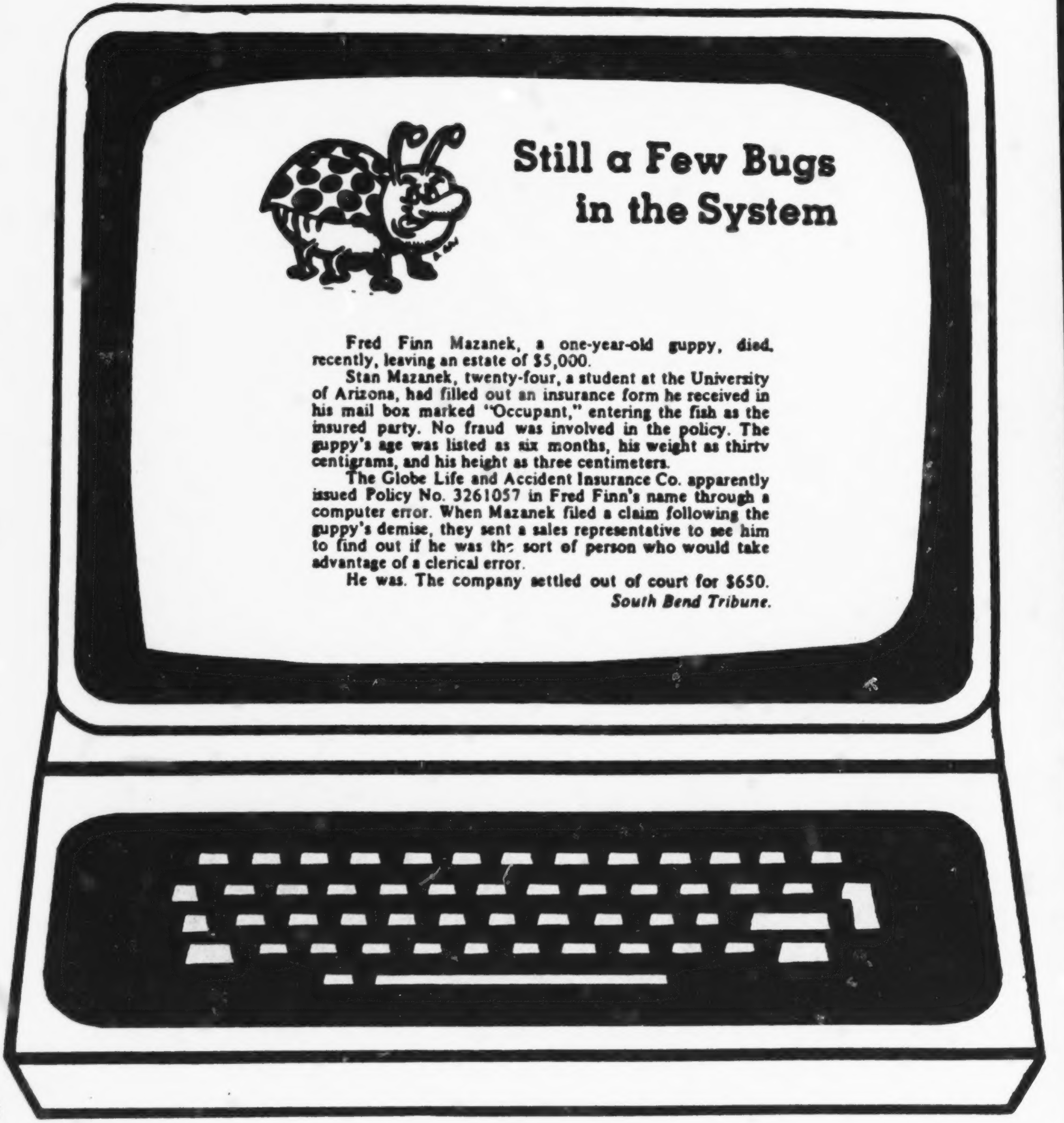
Can you answer these questions?

1. Copying commercial software programs:
    - a. Is illegal.
    - b. Is OK if code can be broken.
    - c. Is OK if you have permission.
    - d. Is OK if teacher knows.

2. Police use computers to:
    - a. Keep track of everyone.
    - b. Know the actions of crooks.
    - c. Check who owns a car.
    - d. None of the above.

3. The increased use of computers:
    - a. Creates new jobs.
    - b. Replaces thinking.
    - c. Takes away jobs.
    - d. Creates new jobs and takes away jobs.

DID YOU KNOW??



Still a Few Bugs in the System

Fred Finn Mazanek, a one-year-old guppy, died, recently, leaving an estate of $5,000.

Stan Mazanek, twenty-four, a student at the University of Arizona, had filled out an insurance form he received in his mail box marked "Occupant," entering the fish as the insured party. No fraud was involved in the policy. The guppy's age was listed as six months, his weight as thirty centigrams, and his height as three centimeters.

The Globe Life and Accident Insurance Co. apparently issued Policy No. 3261057 in Fred Finn's name through a computer error. When Mazanek filed a claim following the guppy's demise, they sent a sales representative to see him to find out if he was the sort of person who would take advantage of a clerical error.

He was. The company settled out of court for $650.

South Bend Tribune.

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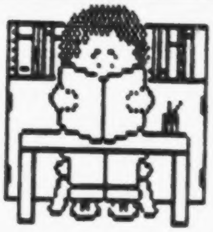
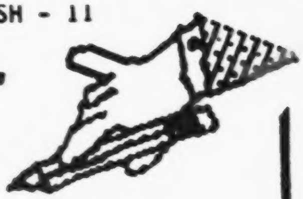


WORDS TO KNOW

Access code	- A secret password that enables you to use a computer file.
Copy-protected	- Coded so as to prevent the buyer from making a copy.
Copyright notice	- A statement that tells who has the exclusive right to reproduce a software program and sell it.
Data	- Facts you enter into a computer.
Data bank	- A vast collection of information stored on computer disks or tape.
Data base	- A computerized store of information usually on one subject only.
Public domain software	- Computer programs available to the public at no cost.



ACTIVITIES - COMPUTERS IN OUR SOCIETY

HOW DID THE COMPUTER HELP CHASE DOWN THE CRIMINALS?

Match each statement with the best word on the right. No words are used twice. Not all words are used.

_____ 1. Pattern of bars on grocery store items.

_____ 2. A computer programming language.

_____ 3. Step-by-step set of directions telling the computer exactly how to solve a problem.

_____ 4. Brand names of computers.

_____ 5. Used on checks to read a person's bank account number.

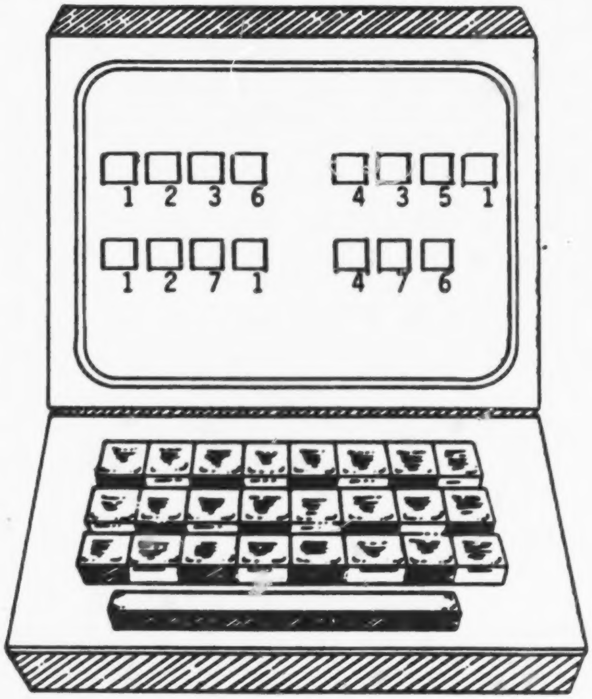
_____ 6. Two-dimensional picture showing a step-by-step set of directions.

_____ 7. A small computer.

A Mini computer
B Data
D Keypunch cards
E Program
H Basic
I Output
L Screen
N Magnetic ink numbers
O Mainframe
T Universal Product Code (UPC)
W Apple, IBM, Commodore
Y Flowchart

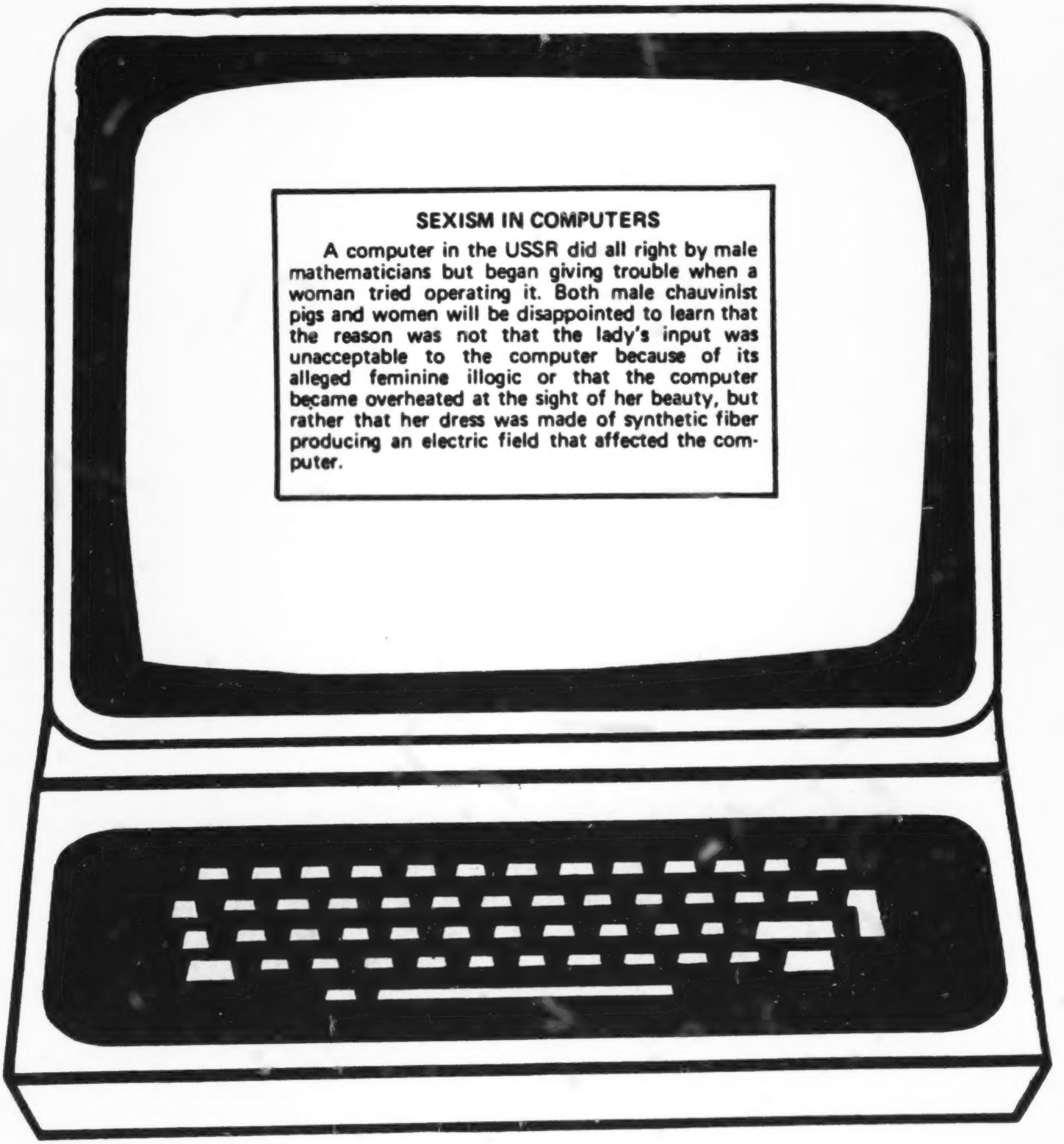
Now, place your answers below in the computer's reply.

IT TOLD THE LAW ENFORCEMENT OFFICERS:



ANSWER:
THEY WENT THAT WAY.

DID YOU KNOW??



SEXISM IN COMPUTERS

A computer in the USSR did all right by male mathematicians but began giving trouble when a woman tried operating it. Both male chauvinist pigs and women will be disappointed to learn that the reason was not that the lady's input was unacceptable to the computer because of its alleged feminine illogic or that the computer became overheated at the sight of her beauty, but rather that her dress was made of synthetic fiber producing an electric field that affected the computer.

COMPUTER RELATED CAREERS

TEA's
ESSENTIAL ELEMENT

a. Identify computer-related careers, including training requirements.

1. Describe the responsibilities of Operations Personnel, i.e.:

   - computer operators
   - keypunch operators
   - data-entry operators
   - media specialists

2. Describe responsibilities of Systems and Programming Personnel, i.e.:

   - systems analyst
   - applications programmer
   - systems programmer
   - database specialist

3. Describe responsibilities of the Computer Technician.

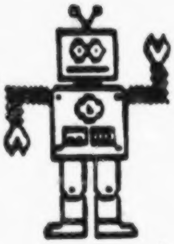
4. Describe responsibilities of Computer Development Personnel, i.e.:

   - computer scientist
   - engineers
   - assemblers

b. Describe the impact of automation on the job market.

1. State the value of computer skills for future employment.

2. Name issues related to the effects of computers on employment (e.g., job displacement, retraining, changes in types of skills necessary for certain jobs).



COMPUTERS AND JOBS

Not only has the use of computers changed things in the world since its development, it has also changed jobs too.

Some people are concerned that computers are taking away jobs. They say computers put people out of work. It's true that computer technology has taken over certain kinds of jobs. But at the same time, it is creating many new jobs. Experts say two new jobs are created for every job the computer takes away.

Automation in factories first started in the early 1900's. Many people were put out of work as machines began to be used in factories. People didn't have the training necessary to work with the new machines, and the machines could do more work in less time than people could.

The process of replacing a human worker with a machine is called automation. Companies have found that it is often cheaper to put in new technological machines than to hire more human workers to carry out necessary tasks. Many factory workers are being replaced by computers, particularly computerized robots. Jobs that require measuring, fitting things together, or testing manufactured items are the one's most often being automated.

According to experts, by the year 1990, 75 percent of all jobs will involve the computer in one way or another.

Lots of people today are looking for careers working with computers. Why? Because:

1. There are lots of new jobs to choose from.
2. Many computer jobs are challenging.
3. Computer careers pay fairly well.
4. Good workers get promoted quickly.
5. Computer jobs are available all over the country.
6. Many other career fields are not growing as fast.

PEOPLE WORKING WITH COMPUTERS

Many people who are not technicians use computers in their jobs. Although some of these people may have had some experience working with computers before, many have learned about computers through on-the-job training programs.

Using Computers in Different Jobs

- Computers in Education

Teachers	- use computers as aids in teaching. - use computers to help them grade papers, create tests, or keep attendance records.
Coaches	- use computers to study trends or strategies of competing teams.
School Administrators	- use computers to schedule classes or prepare school budget.
Librarians	- use computers to catalog books and to keep records of the books that have been checked out.

- Computers in Business

Secretaries	- use computers and word processing programs for typing letters, memos, contracts and reports.
Accountants	- use computers and electronic spread sheets to solve financial problems and use graphics for preparing financial reports.
Salespeople	- use computer terminals connected to large computer systems to calculate bills, keep records, and produce customer receipts.

- Computers in Industry and Transportation

Factory Workers	- use computers in warehouses to keep records of products that are shipped to customers or to control robots on the assembly line.
Airlines	- use computers to record flight schedules and passenger reservations. Used to control aircraft in flight. Used to train pilots by simulating all of the different flight conditions, including takeoff and landing.
Truck Drivers	- use computer system to provide an available trucking job, road or weather conditions, etc.

- Computers in Health & Safety

Police	- use computers to store information about known criminals, stolen cars, etc.
Doctors, Nurses	- use computers to record information about a patient's medical history: --for diagnosing diseases --use computers with scanning devices to produce images of a patient's heart and other vital organs.

COMPUTER CAREERS TODAY

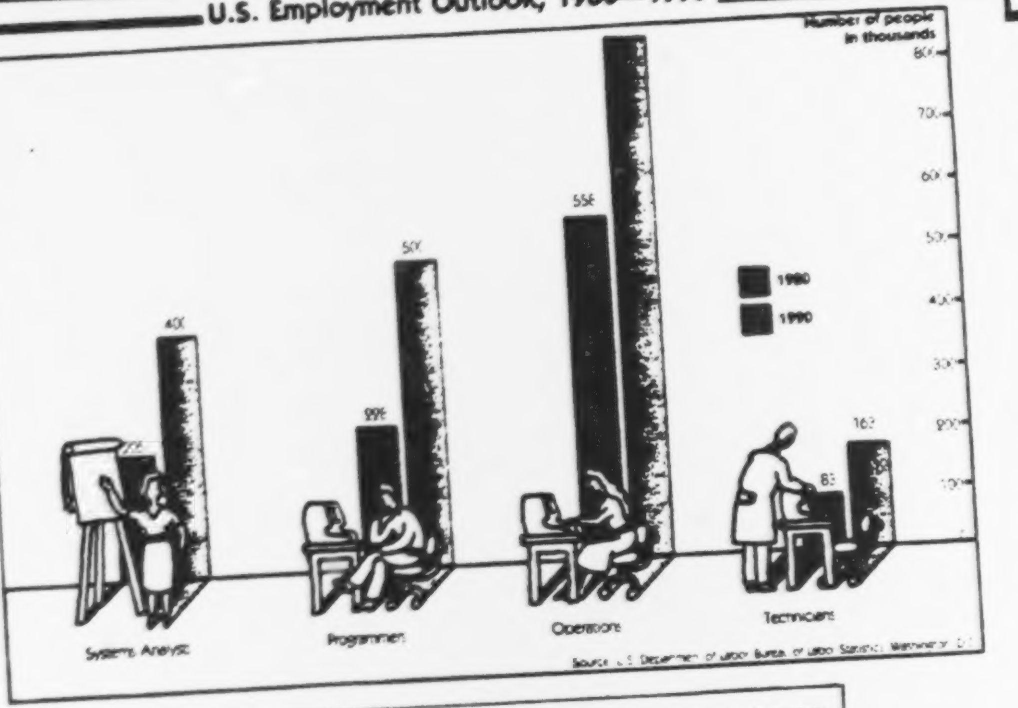
There is a need for people who can work with computers. Each year more companies turn to computers for help in running their businesses. To do this, they set-up data processing departments. Data processing means collecting information (data) and working with facts (processing them) to do a certain job. Those people who work in data processing departments are usually system analysts, computer programmers, operators (data entry, computer), and technicians.

All of these jobs need some type of specialized training. This training ranges from taking classes at vocational schools to obtaining a college degree in computer science.

COMPUTER JOBS

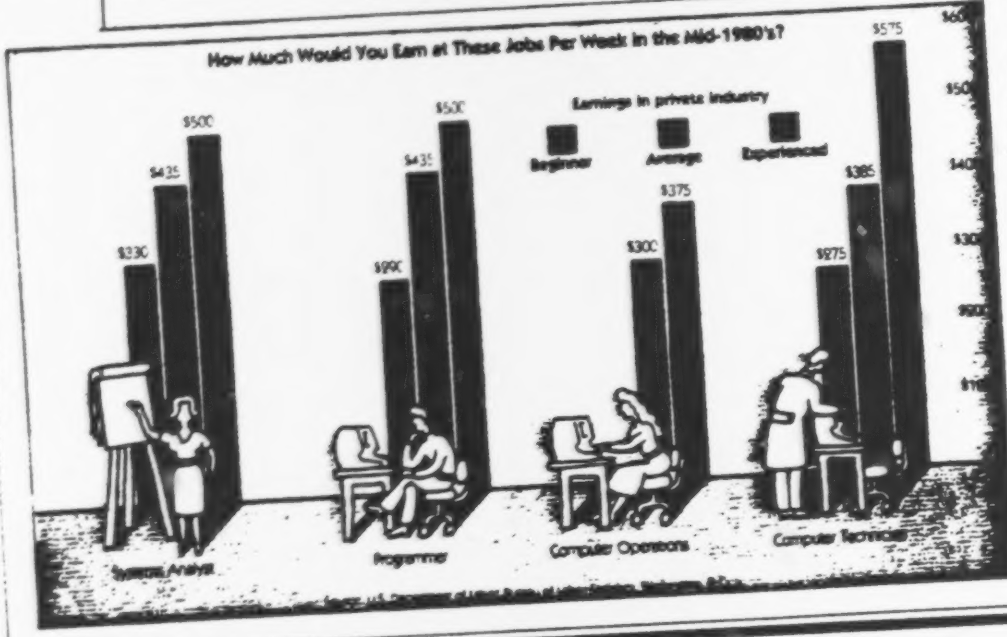
JOB TITLE	JOB DESCRIPTION
Data Entry Operator	Enters information (data) into the computer by using input devices.
Computer Operator	Controls the actual operation of the computer. Responsibilities include scheduling jobs to be run, checking the output; caring for and maintaining the computer and its storage devices (tapes, disks, cards).
Computer Technician	Fixes the equipment and makes sure that it is always in good running order.
Computer Programmer	Writes the programs that control the actions of the computer.
System Analyst	Analyzes a problem to be programmed, designs and develops a plan for the program.
Computer Librarian	Cares for, stores, and catalogues storage media such as tapes and disks.

U.S. Employment Outlook, 1980—1990



Source: U.S. Department of Labor Bureau of Labor Statistics, Washington, D.C.

SYSTEMS ANALYSTS:	People who will help you figure out the best system for the computer to follow.
PROGRAMMERS:	People who write the instructions for the computer.
DATA ENTRY OPERATORS:	People who feed information into the computer.
COMPUTER OPERATORS:	People who load the computer with the correct tapes or cards.
THE TECHNICAL STAFF:	Person makes sure new equipment is running properly, service any technical problems.



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COMPUTER RELATED CAREERS

OPERATIONS PERSONNEL

computer operator	keypunch operator	data-entry operator	media specialist

SYSTEMS AND PROGRAMMING PERSONNEL

systems analyst	applications programmer	systems programmer	database specialist

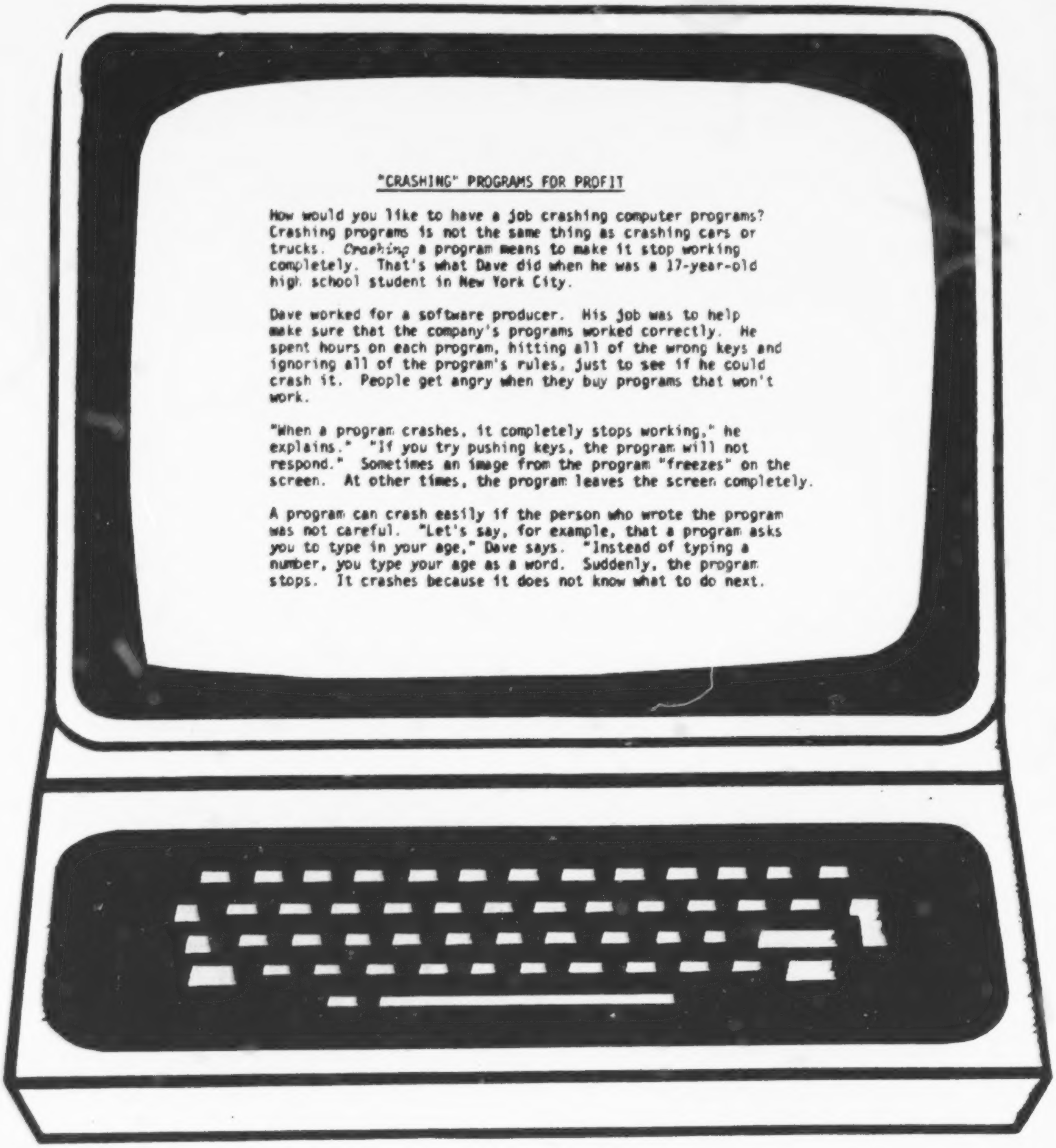
THE COMPUTER TECHNITION

installation	maintenance	repair

COMPUTER DEVELOPMENT PERSONNEL

computer scientist	engineers	assemblers

DID YOU KNOW??



"CRASHING" PROGRAMS FOR PROFIT

How would you like to have a job crashing computer programs? Crashing programs is not the same thing as crashing cars or trucks. *Crashing* a program means to make it stop working completely. That's what Dave did when he was a 17-year-old high school student in New York City.

Dave worked for a software producer. His job was to help make sure that the company's programs worked correctly. He spent hours on each program, hitting all of the wrong keys and ignoring all of the program's rules, just to see if he could crash it. People get angry when they buy programs that won't work.

"When a program crashes, it completely stops working," he explains." "If you try pushing keys, the program will not respond." Sometimes an image from the program "freezes" on the screen. At other times, the program leaves the screen completely.

A program can crash easily if the person who wrote the program was not careful. "Let's say, for example, that a program asks you to type in your age," Dave says. "Instead of typing a number, you type your age as a word. Suddenly, the program stops. It crashes because it does not know what to do next.

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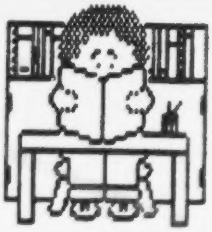


WORDS TO KNOW

AUTOMATION:	The process of replacing a human worker with a machine.
COMPUTER ENGINEER:	A person who runs a computer, particularly a mainframe.
COMPUTER TECHNICIAN:	A person who repairs computers and installs computer equipment.
KEYPUNCH OPERATOR:	A person who operates a keypunch machine.
PROGRAMMER:	A person who writes computer programs.
SOFTWARE LIBRARIAN:	A person in charge of a large collection of software in a company.
SYSTEMS ANALYST:	A person who analyzes a situation and designs a computerized system to handle it.
OPERATIONS STAFF:	People whose jobs involve processing and filing computer information.
DATA PROCESSING:	The handling (processing) of facts and information (data) by a computer.
ROBOT:	A mechanism, guided by a computer, able to perform certain human tasks. Robot comes from a Czech word meaning "forced work."
ROBOTICS:	The study of the construction and uses of robots.

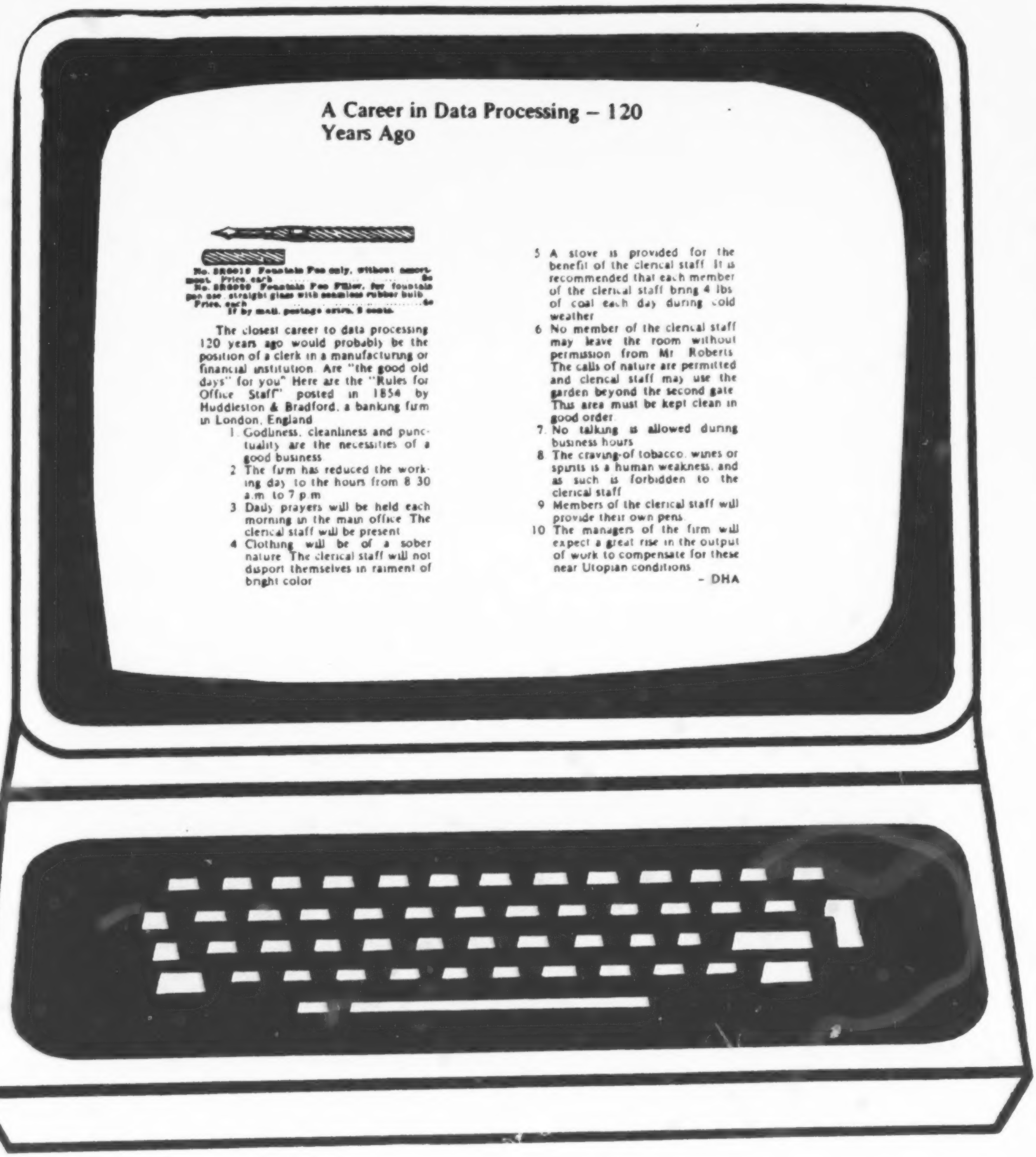
WHO WOULD YOU HIRE?

Suppose you are running a company that is using computers. Which of the following persons would you hire to help you with the problems you need to have solved?

- Systems Analyst
- Computer Programmer
- Service Technician
- Operations staff (data entry, computer operators, tape librarian)

PROBLEMS	WHO WOULD YOU HIRE?
You need to organize tapes and cards	
You need to repair a broken computer	
You need advice about what equipment you buy.	
You need to develop a new payroll program.	
You need to install new equipment.	
You need someone to "debug" a new program.	
You need to enter new data into the computer.	

DID YOU KNOW??



A Career in Data Processing – 120 Years Ago

No. 8R0010 Fountain Pen only, without assortment. Price, each 5c
No. 8R0050 Fountain Pen Filler, for fountain pen use, straight glass with seamless rubber bulb. Price, each 5c
If by mail, postage extra, 2 cents.

The closest career to data processing 120 years ago would probably be the position of a clerk in a manufacturing or financial institution. Are "the good old days" for you? Here are the "Rules for Office Staff" posted in 1854 by Huddleston & Bradford, a banking firm in London, England

1. Godliness, cleanliness and punctuality are the necessities of a good business
2. The firm has reduced the working day to the hours from 8 30 a.m to 7 p.m
3. Daily prayers will be held each morning in the main office The clerical staff will be present
4. Clothing will be of a sober nature The clerical staff will not disport themselves in raiment of bright color
5. A stove is provided for the benefit of the clerical staff It is recommended that each member of the clerical staff bring 4 lbs of coal each day during cold weather
6. No member of the clerical staff may leave the room without permission from Mr Roberts The calls of nature are permitted and clerical staff may use the garden beyond the second gate This area must be kept clean in good order
7. No talking is allowed during business hours
8. The craving of tobacco, wines or spirits is a human weakness, and as such is forbidden to the clerical staff
9. Members of the clerical staff will provide their own pens
10. The managers of the firm will expect a great rise in the output of work to compensate for these near Utopian conditions

– DHA

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Computer Careers Aptitude Activities

Are you ready for a career working with computers? There are lots of different types of jobs. You could be a systems analyst, a programmer, an operations staff member, or a technician. Or you might help design and build computers or even sell them. Are computers for you? Which types of computer-related jobs would fit your personality and interests? Start finding the answers by completing the following activities.

I. What are you like?
Read each incomplete sentence below. Then choose the ending that best describes you. Circle your answer. There are no right or wrong answers. Just pick the one that fits you best.

1. I would describe myself as ____ .
   a. a patient person
   b. a somewhat impatient person
   c. an impatient person
2. When I give directions to other people, my directions are usually ____ .
   a. fairly exact
   b. a little confusing
   c. mixed up
3. When I am dealing with a problem, I usually ____ .
   a. think through all sides carefully
   b. make a quick decision
   c. have a hard time making a decision
4. When I have a difficult task to complete, I usually ____ .
   a. work hard until I get the job done
   b. get tired and want to give up
   c. give up easily
5. When I have to deal with numbers, I usually ____ .
   a. feel confident that I can get the job done
   b. have some trouble, but don't panic
   c. get nervous and upset quickly
6. When I have to work with machines, I usually ____ .
   a. feel in control
   b. feel a little nervous
   c. feel unsure of myself
7. I would prefer a job in which I worked ____ .
   a. indoors most of the time
   b. both indoors and outdoors
   c. outdoors most of the time

Look back at your answers.
If you chose answer *a* to complete most of the sentences, you are probably a computer person. You have the type of personality needed for a computer career.

If you chose answer *b* most of the time, then you might become a computer person, when you learn a little more about computers.

If you chose answer *c* most of the time, then you might have a little trouble in a career with computers right now. But with a little practice, you could become a computer person too.

II. Making a career match.

Listed below are the four data processing career fields that were described in this chapter. Below each field name is a list of qualities or skills needed for a career in that field. Put a check next to each quality that you possess. Some of the same qualities may apply to different fields. When you are finished, look over your responses to see which field seems to match your personality and interests best.

1. Systems analyst

____ able to analyze things thoroughly

____ enjoy reading

____ able to read detailed materials

____ able to make firm decisions

____ enjoy experimenting with new things

____ able to budget money and find bargains

____ don't like to waste time or energy

____ able to write clear letters and reports

2. Computer programmer

____ able to analyze things thoroughly

____ enjoy experimenting with new things

____ don't give up easily

____ able to be very exact

____ able to be patient

____ willing to repeat the same things over and over

____ able to learn from your own mistakes

____ able to follow complicated instructions

____ have a good memory

3. Operations staff member

____ able to follow instructions carefully

____ enjoy working with machines

____ enjoy working with numbers

____ able to keep things neat and well-organized

____ able to notice and correct mistakes

____ willing to repeat the same things over and over

____ enjoy working at a desk

4. Computer technician

____ enjoy taking things apart to see how they work

____ not afraid to get "inside" electronic devices

____ handy with tools

____ able to analyze things thoroughly

____ enjoy experimenting with new things

____ able to read charts and diagrams

____ able to follow complicated instructions

____ don't give up easily

____ don't like sitting at a desk

(Taken from "Understanding Computers" by Jack L. Roberts, Scholastic Inc.)

DIFFERENT JOB DESCRIPTIONS USING COMPUTERS

JOB TITLE: WORD PROCESSING OPERATOR

1. Traits and Skills.

- Typing speed of 50-60 words per minute.
- Ability to read and follow directions.
- Ability to use dictionaries, handbooks, and other reference materials.
- Flexibility.
- Patience.
- Good grammar, spelling and punctuation skills.
- Good reading comprehension.
- Good verbal skills.
- Ability to work as part of a team.
- Accuracy.
- Dependability.

2. Job Responsibilities.

- Uses word processing equipment such as electronic typewriters, printers, and display systems.
- Maintains production records and does some proofreading.
- Handles special documents.
- Communicates with users and management in oral and written form.

3. Training.

- Six to twelve months of word processing experience.
- Community colleges and private schools offer programs leading to associate's and bachelor's degrees.
- Vocational and trade schools offer degree programs.

4. Related Careers.

- Administrative assistant.
- Word processing trainee.
- Secretary.
- Word processing supervisor.

5. Where to Find Jobs.

- Business firms.
- Public utilities.
- Hospitals.
- Word processing service bureaus.
- Federal, state, and local gov.
- Manufacturers.
- Insurance companies.
- Office temp agencies.

JOB TITLE: COMPUTER OPERATOR

1. Traits and Skills.

- Ability to think logically.
- Ability to work quickly and accurately.
- Work well as part of a team.
- Possess independent judgment.
- Comfortable working with electronic computer equipment.

2. Job Responsibilities.

- Loading the computer with the correct equipment (tapes, disks).
- Running the computer.
- Paying attention to signals from the computer.
- Solving problems with the running of the computer.

3. Training.

- High school education, training in mathematics and computers.
- Post-secondary school training in data processing preferred.

4. Related Careers.

- Data entry operator.
- Data entry supervisor.
- Production control clerk.
- Tape librarian.
- Production control supervisor.

5. Where to Find Jobs.

- Manufacturing companies.
- Wholesale and retail trade establishments.
- Data processing companies.
- Large corporations.
- Banks.
- Government agencies.

JOB TITLE: COMPUTER SERVICE TECHNICIAN

1. Traits and Skills.

- Good with hands.
- Good at detail.
- Good at record-keeping.
- Enjoy working with people.
- Good oral and written skills.
- Ability to work without close supervision.
- Good vision; not color blind.
- Ability to reason logically.

2. Job Responsibilities.

- Services computer systems to keep them operating efficiently.
- Detects and fixes computer breakdowns.
- Installs new equipment.
- Keeps records of maintenance and repairs on each machine.
- Listens to customer complaints; answers questions.
- Attends training sessions to keep up with changes.

3. Training.

- One to two years post-high school; basic electronics or electrical engineering.
- In addition, three to six months at a computer company's training center.
- Finally, six months to two years of on-the-job training.

4. Related Careers.

- Computer specialist or trouble shooter.
- Computer service manager.
- Computer equipment salesperson.

5. Where to Find Jobs.

- Computer manufacturers.
- Companies that provide computer maintenance services.
- Large computer installations.

JOB TITLE: ROBOT MAINTENANCE TECHNICIAN

1. Traits and Skills.

- Good with hands.
- Good at detail.
- Good at record-keeping.
- Patience.
- Ability to understand diagrams and drawings.
- Ability to think logically.

2. Job Responsibilities.

- Maintaining and repairing robots.
- Cleaning and changing parts.
- Keeping complete and up-to-date records on each robot.
- Locating and fixing problems.
- Reading and interpreting blueprints and engineering specifications.

3. Training.

- Robot manufacturers provide training programs.
- Some industries employ their own training specialists.
- Community colleges and vocational schools offer training.

4. Related Careers.

- Robot construction worker.
- Robot salesperson.
- Robot operator.
- Robot customer service person.

5. Where to Find Jobs.

- Robot manufacturing companies.
- Automobile manufacturing companies.
- Factories.

JOB TITLE: ELECTRONICS TECHNICIAN

1. Traits and Skills.

- Good with hands.
- Good at detail.
- Ability to follow directions.
- Enjoy working on own.
- Precision.
- Good eyesight; not color blind.

2. Job Responsibility.

- Building electronics boards for microcomputers and other electronic products.

3. Training.

- 18 months post-high school.
- Study of electricity and electronics.

4. Related careers.

- Air conditioning and refrigeration servicing (9-month course).
- Electronics servicing (12-month course).
- Electronics engineering associate (24-month course).

5. Where to Find Jobs.

- Electronics manufacturers.
- Federal government.

JOB TITLE: CAT SCAN TECHNOLOGIST

1. Traits and Skills.

   - Attention to detail.
   - Physical strength.
   - Physical and emotional stamina.
   - Good with hands.
   - Dependability.
   - Mathematical ability.

2. Job Responsibilities.

   - Positions patients for CAT scan procedure.
   - Operates computer console that controls CAT scan procedure.
   - Uses printer to make final print of image on screen.
   - Assists radiologist in daily work.

3. Training.

   - Two-to-four-year program in radiography is offered at hospitals, community colleges, and universities.

4. Related Careers.

   - EEG technician.
   - EKG technician.
   - Radiation therapy technologist.
   - Sonographer.

5. Where to Find Jobs.

   - Hospitals.
   - Clinics.
   - Veterans Administration Hospitals.

JOB TITLE: COMPUTER-AIDED DRAFTER

1. Traits and Skills.

- Ability to use computerized drafting systems.
- Ability to visualize and create freehand drawings of three-dimensional objects.
- Accuracy and neatness in work.
- Careful attention to detail.
- Some artistic ability a plus.
- Good eyesight.
- Good with hands.
- Ability to work as part of a team.

2. Job Responsibilities.

- Prepares detailed drawings based on sketches and calculations made by engineers, scientists, and architects.
- Calculates strength, quality, and cost of materials.
- Uses computer-aided systems and electronic drafting equipment to prepare drawings.

3. Training.

- Specialized training in technical institutes, junior and community colleges, vocational and technical schools.
- Training can range from completion of a three-year vocational high school program (for drafter trainee job) to three-to-four years post-secondary training (for job as a computer-aided drafter).

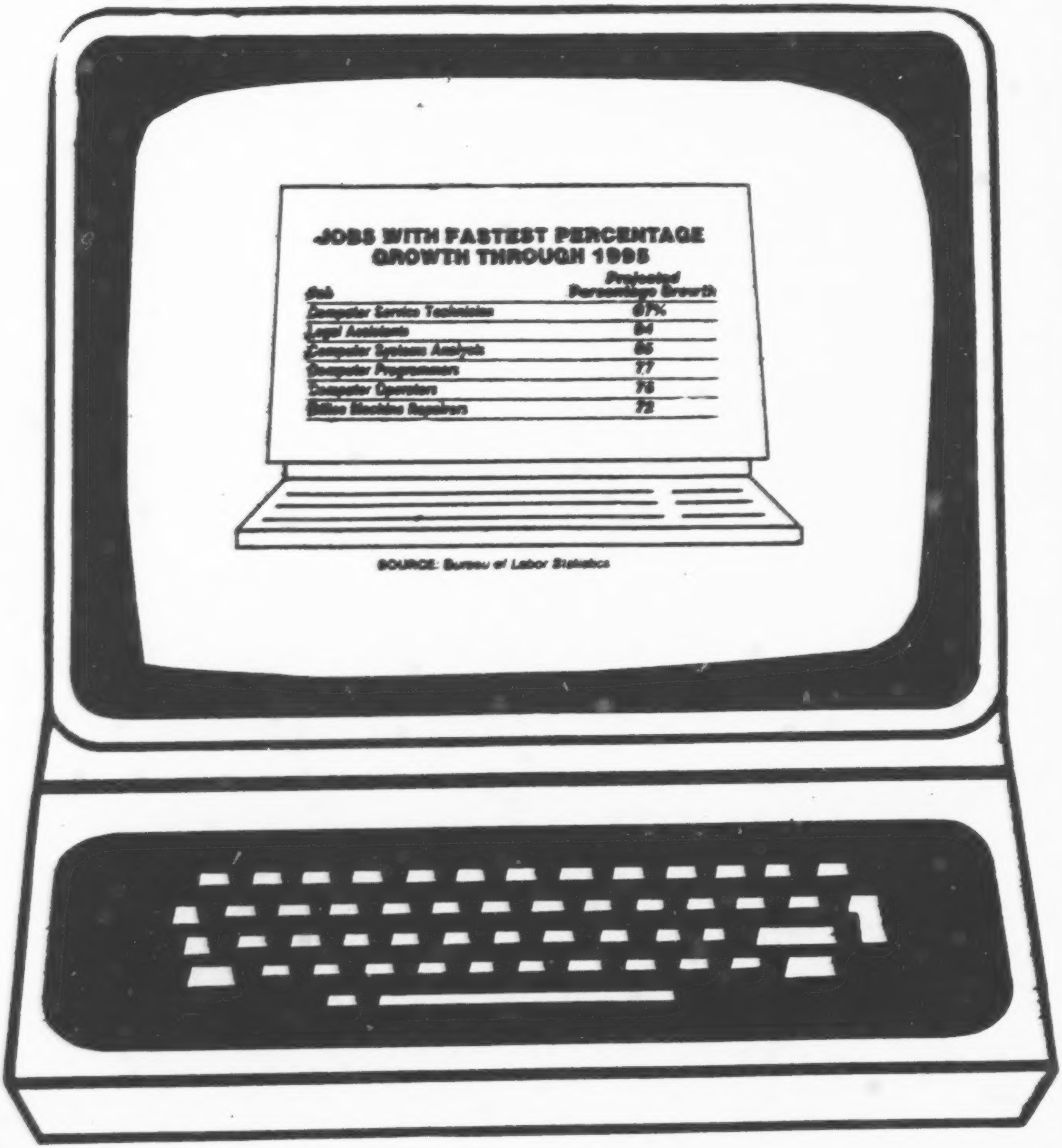
4. Related Careers.

- Senior drafter.
- Junior drafter.
- Surveyor.

5. Where to Find Jobs.

- Engineering firms.
- Architectural firms.
- Manufacturing industries (aircraft, shipbuilding, electronics).
- Federal and state government.

DID YOU KNOW??



JOBS WITH FASTEST PERCENTAGE GROWTH THROUGH 1995

Job	Projected Percentage Growth
Computer Service Technicians	97%
Legal Assistants	94
Computer Systems Analysts	85
Computer Programmers	77
Computer Operators	76
Office Machine Repairers	72

SOURCE: Bureau of Labor Statistics

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DID YOU KNOW??

NO PH.D. REQUIRED

Would I have to have a Ph.D. to get a job in the field of artificial intelligence?

Companies are filling more jobs related to artificial intelligence, the science that tries to teach computers to learn, think, and reason like humans.

Companies that develop AI software products now need skilled people in software engineering management, knowledge engineering, AI training, marketing, market support, technical writing and government liaison, as well as experts in such specific industries as banking, insurance, engineering, travel and finance.

Nearly 200 firms are working on AI, primarily on "expert systems" software to be used in geology, medicine, finance, and other specialties, and each wants on staff one of a handful of the true geniuses in the field. Although AI is likely to be one of the "take-off" fields for the balance of the century, most companies rushing headlong into the business are not going to survive in the long run.

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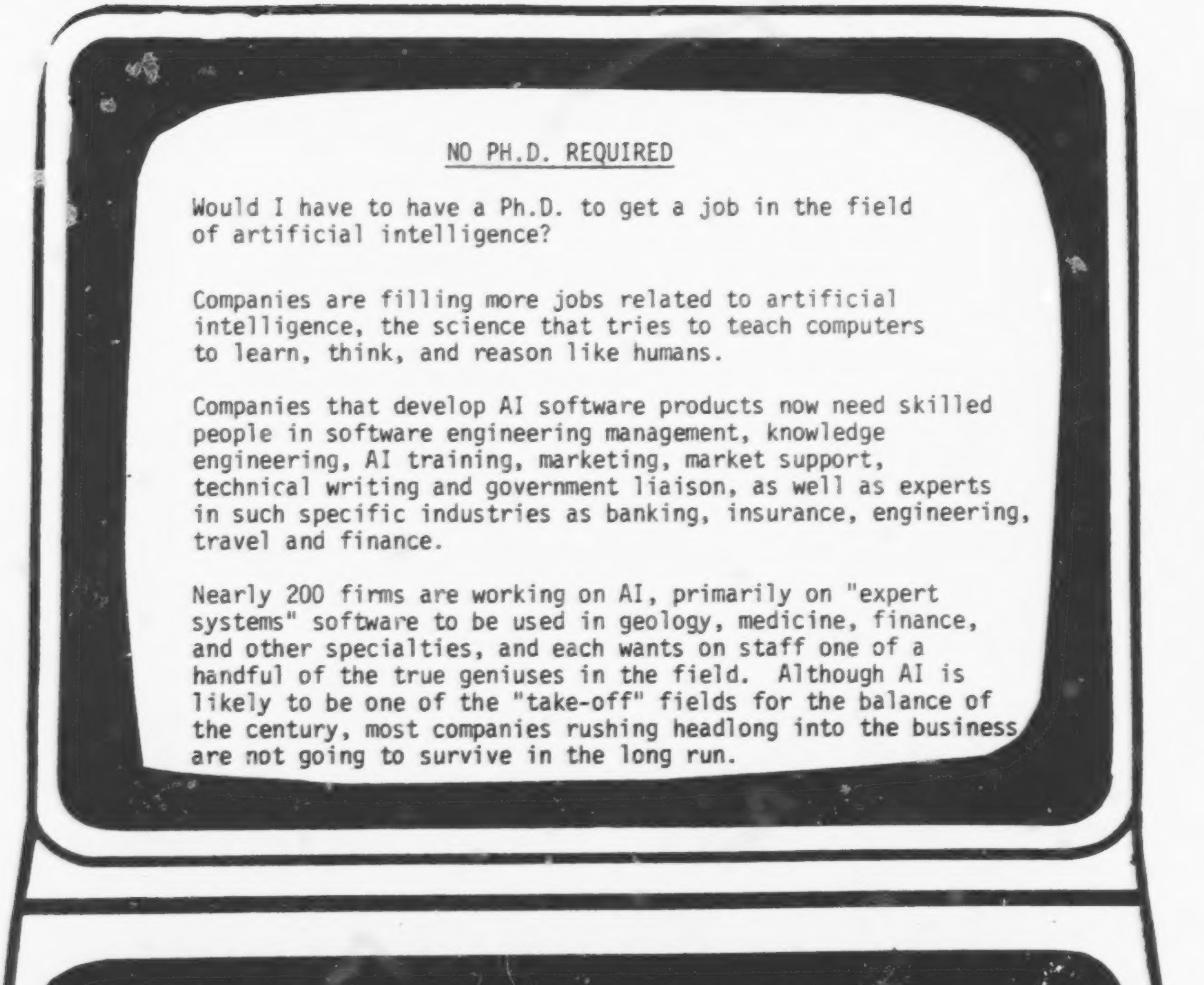

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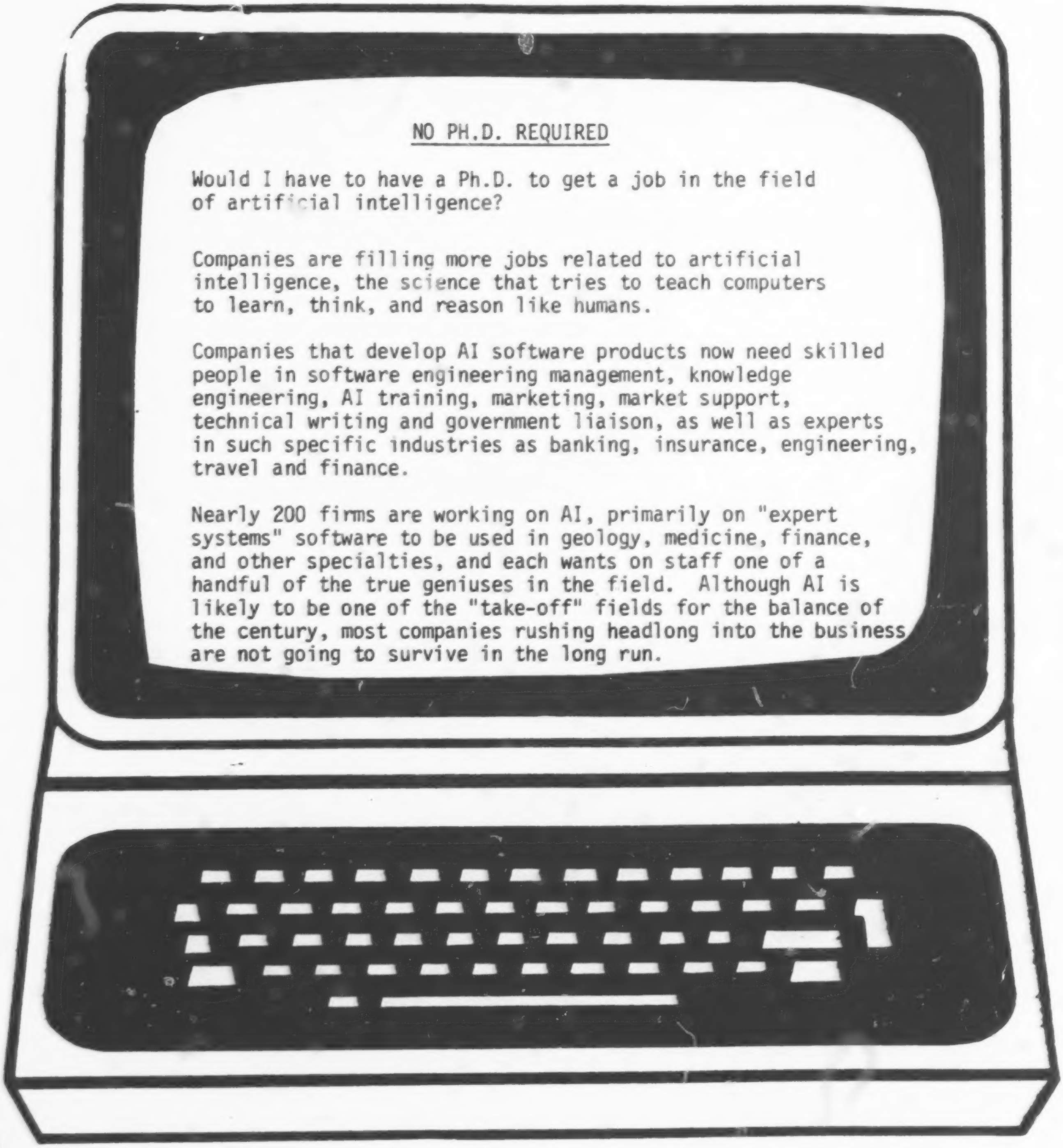

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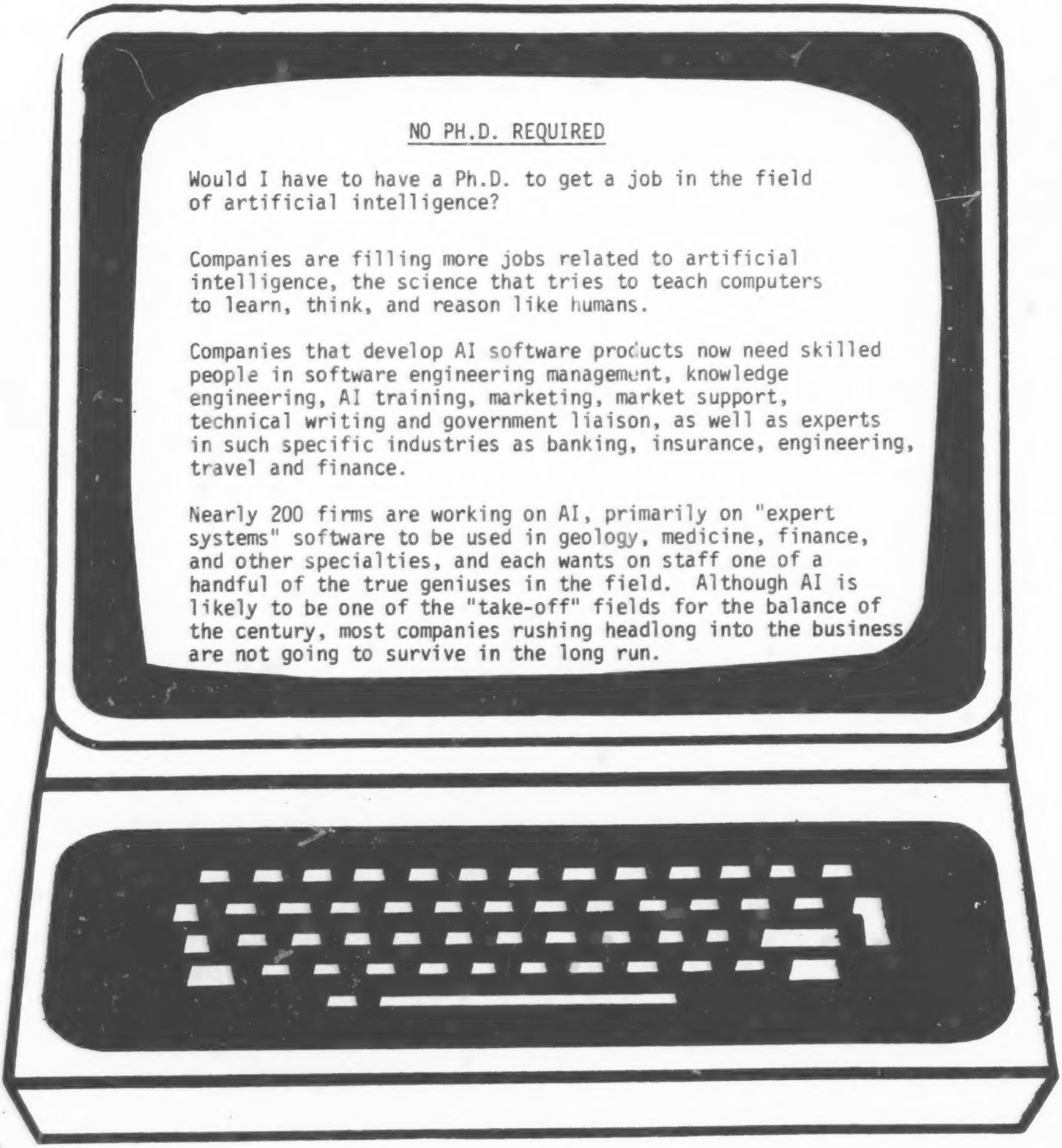

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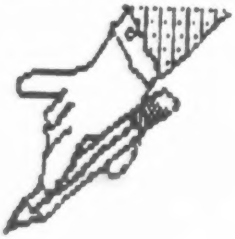

CAREER SEARCH

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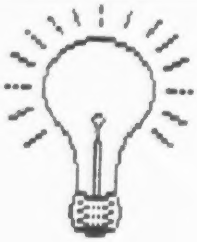
W J I Q O T M R G S Q Y H M U R I K E Q E F H X V
L Q Y F R Z S Q S P D T X S Q T F X E R R G M T E
Z J F K M B E X O Z L U E Z W I S F R R B W J J H
```

THERE ARE 17 WORDS HERE -- CAN YOU FIND THEM?

HERE ARE THE WORDS TO LOOK FOR:

BANKER
BUYER
DRAFTER
ENGINEER
LIBRARIAN
PILOT
PROGRAMMER
SCIENTIST
STOCKBROKER
BOOKKEEPER
CASHIER
DOCTOR
EDITOR
LAWYER
MANAGER
POLICEMAN
REPORTER



ACTIVITIES

Newspaper Search - Read the want ads in the local newspaper that describe jobs requiring computer knowledge. Then answer the following questions:

1. What type of job is being advertised?
2. What type of education is required?
3. What computer language does the applicant need to know?
4. What are some of the job responsibilities?
5. What is the starting salary?
6. Where can the applicant obtain an application?
7. Is there a closing date for this position?

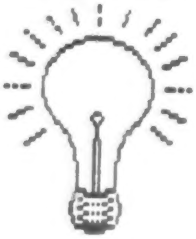
Activity

Work in groups to develop three charts: one showing people working with computers, one showing people whose jobs might be accomplished by computers, and one showing people doing jobs that only human beings can do.

Indicate your job, or job you would like to have, and tell the effects that computers have had, or will have, on each of them.

Activity

Ask a local job placement center about the most commonly available computer-related jobs. Write a report on the jobs, including salary range and educational requirements.



Activity

Discuss how jobs outside the computer industry have been changed, how future trends may go, and the impact of this upon your career choices.

Learn about the use of robots in industry. What types of jobs do they do. How much do they cost in comparison to what human factory workers cost employers per hour? How are robots used to enhance safety in a factory? Locate an article or book about robotics. How will robots probably be used in business and industry in the future?

Make a list of jobs that have disappeared because of automation. Choose a job that you think will be eliminated from the job market in the near future and discuss how a technical tool might do the same work.

Interview a person in a computer career. Ask him/her to describe major job responsibilities, a typical day, and the best-liked and least-liked aspects of his/her work.

Write to computer hardware manufacturers and request information about their products, services, and career opportunities.

Write to a computer software development company to find out about the types of skills needed for employment.

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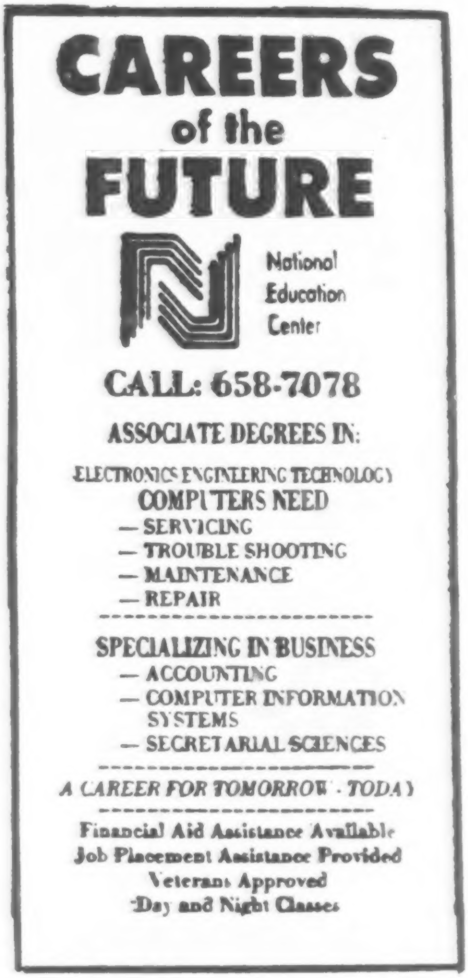
EXAMPLES OF TRAINING FOR COMPUTER JOBS LISTED IN NEWSPAPER



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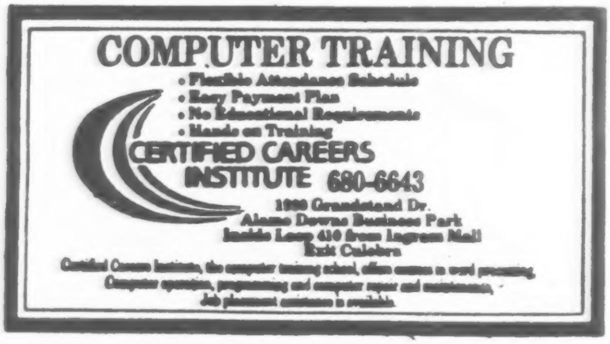

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Certified Careers Institute, the computer training school, offers courses in word processing, Computer operation, programming and computer repair and maintenance. Job placement assistance is available.

WHAT DID THE HOME COMPUTER SAY TO ITS NEW OWNER?

To find out, fill in the letter of the best response and use your responses to find the computer's question.

_____ 1. The person who writes instructions that tell the computer how to handle information is the (a) programmer (b) computer operator (c) technician.

_____ 2. A data entry clerk (a) supervises the computer operations (b) writes the instructions to the computer (c) transcribes the instructions into computer readable form.

_____ 3. Computer operators will (d) install and maintain equipment (e) supervise machine operations (f) transcribe material onto cards or tape.

_____ 4. Compared to other people in the computer field, key punch operators earn a relatively (d) low salary (e) medium salary (f) high salary.

_____ 5. The person who installs and maintains equipment is called a (k) computer technician (l) computer operator (m) systems analyst.

_____ 6. The person who develops methods of using the computer to solve problems is the (k) computer operator (l) manager (m) systems analyst.

_____ 7. A college degree would generally be required for a person to become a (m) data entry clerk (n) computer operator (o) systems analyst.

_____ 8. The person who classifies, catalogs and maintains reference material used for processing is called the (n) computer operator (o) systems analyst (p) documents librarian.

_____ 9. The person earning the highest salary, relative to the others given, is the (r) key punch operator (s) systems analyst (t) computer operator.

_____10. Data entry is a job that (r) requires programming knowledge (s) requires a 4-year college degree (t) requires little knowledge about the computer.

_____11. A computer programmer needs to be able to (r) think logically, and like detailed work (s) type data into the computer quickly (t) operate all the different types of computer equipment.

_____12. The person who repairs computers and does preventive maintenance is the (u) technician (v) systems analyst (w) salesperson.

_____13. The number of computer related jobs is (x) decreasing (y) increasing (z) remaining about the same.

Response:

__ __   __ __ __   __ __ __ __ __
4 7   13 7 12   9 8 3 1 5

__ __ __ __ __ __ __ __ __ __ __?
2 7 6 8 12 10 3 11 3 9 3

HINT!!!

"Say something in computerese."

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WHAT IS A COMPUTER ?

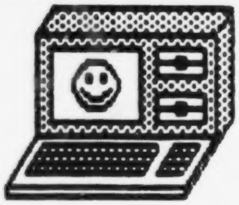
TEA's
ESSENTIAL ELEMENT

Computer Use -

A. Identify different types of computers.

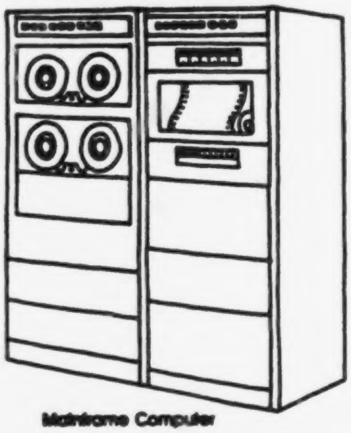
    1. Differentiate among micro-, mini-, and mainframe computers.

    2. Recognize capabilities of different computer types (based on word size, speed storage capacity, and other unique attributes).



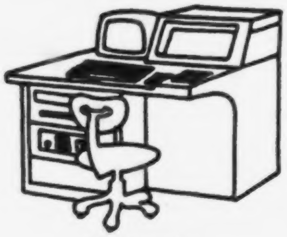
TYPES OF COMPUTERS

Computers come in many sizes and shapes. They range from very large computer systems called mainframe computers to minicomputers or even smaller microcomputers.



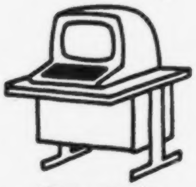
Mainframe Computer

Mainframe computers are very large. They can store large amounts of information; do many jobs at one time; and cost thousands, sometimes millions, of dollars. Mainframe computers often have terminals connected to them that allow other computers or people to communicate with the mainframe even though they may not be in the same room, building, or city.



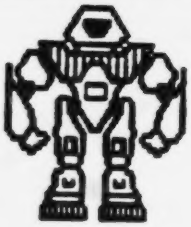
Minicomputer

Minicomputers are smaller than mainframes with most fitting on a table. Minicomputers can handle more than one job at a time and cost ten to 100 thousand dollars. They are used by medium to large companies, and also have terminals (though not as many as a mainframe) connected to them.



Microcomputer

Microcomputers are even smaller than minicomputers. They are also called "home computers" because many people buy them for their own personal use. They fit on a desk top and usually cost $500-$5,000. Microcomputers cannot store as much information and although they are used for different kinds of jobs, they can not do a lot of different jobs at one time.



MICROCOMPUTERS

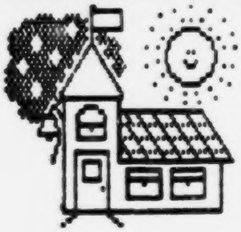
- Small physical size
- Moderately priced $200—$6,000
- Large, expandable memory
- No special power or environment
- Relative ease of use

MINICOMPUTERS

- Moderately large
- Complex
- Moderately powerful
- Moderately expensive-$15,000-hundred thousand
- Special power connections
- Need background to operate

MAINFRAME COMPUTERS

- Large
- Complex
- Powerful
- Expensive—$30,000—millions
- Special power & environment
- Need to be programmer



WHAT IS A COMPUTER?

A computer is a machine. Like other machines, it has been built by people to make our work easier. A computer is not smart; people have to tell it exactly what to do, step-by-step.

A computer can:

- Store a huge amount of information in its memory and recall it when needed.
- Do calculations quickly.
- Sort things.
- Do repetitious jobs.
- Combine facts that people give it.

A computer cannot:

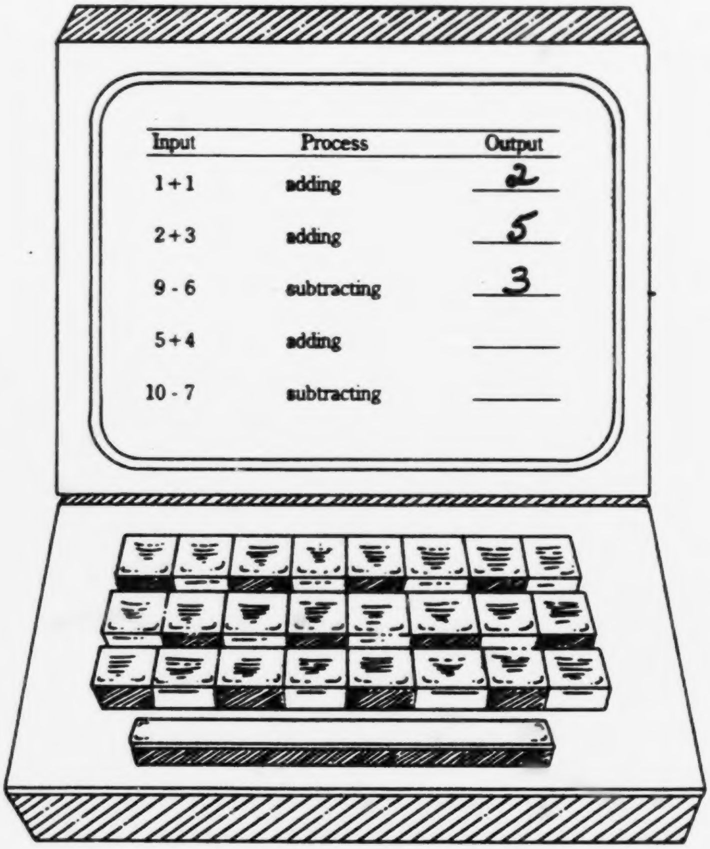
- Feel emotions such as happiness, sadness, or anger.
- Make moral judgments about what's right and wrong.
- Think up its own new ideas.

Computer literacy is like any other skill you've learned. It takes time and practice to learn, but it puts you in control of the computer and frees you from having to depend on and trust a computer expert. When you become computer literate, you will know two important things: (1) What things a computer can do, and (2) How to tell a computer to do the things you want it to do.

HOW DO YOU THINK?

Have you ever thought about how you think? Information goes into your brain through your senses (sight, hearing, taste, touch, and smell), your brain works on that information, and you then respond.

- The information that goes in is INPUT.
- Your brain PROCESSES the information.
- What you do as a result is OUTPUT.



Input	Process	Output
1+1	adding	2
2+3	adding	5
9 - 6	subtracting	3
5+4	adding	
10 - 7	subtracting	

HOW DO COMPUTERS THINK?

A computer works like a brain. It takes information (INPUT), processes that information (through a series of operations, actions, or changes), stores the information and provides answers (OUTPUT). The devices that perform the four functions are known as hardware.

> "If you touch it, see it, smell it,
> or lift it, it's hardware."

Different kinds of hardware can be used to vary the way in which data is entered, processed, stored, and provided.

INPUT DEVICES

Input hardware is used to get data into a computer. The choice of an input device depends upon the purpose for which a computer is used and upon the amount of data that must be entered.

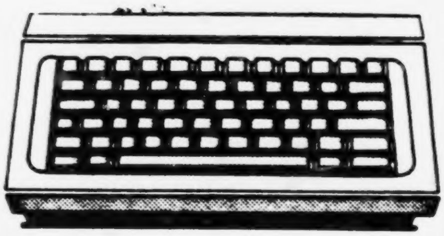
The job of an input device is easy to remember if you break the word into syllables and turn the syllables round.

in-put ➡ put in

When an input device receives its information, its job is to put that information into the computer.

INPUT DEVICES

KEYBOARD



The keyboard is an input device that is used to type data directly into a computer. A keyboard is similar to a typewriter. When the computer asks you a question, you enter your answer by typing it on a keyboard. If the data is incorrect when it is entered into the computer, the computer's result will be incorrect, too. In most cases, the person who entered the data made the mistake -- not "the computer made a mistake." Some people describe this process as GIGO (garbage in, garbage out); it means if you put in incorrect data, you will get incorrect answers.

CARD READER

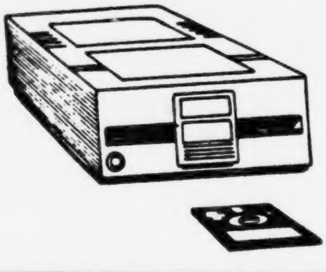
A card reader is a type of input device. A card reader reads data from punched cards and sends the data to the computer. Punched cards have holes or notches that have been cut into them by a keypunch machine, which is like a typewriter. Each hole or notch has a special meaning, depending on where it has been punched into the card. When a company has large amounts of data to enter into a computer, the fastest way to enter the data is by using punched cards, rather than a keyboard. There are two problems with using punched cards. (1) They require a great deal of storage space, and (2) They cannot be reused.

BAR CODE READERS

Bar code readers are used for input in grocery stores and other businesses that sell products with coded price tags. The bar codes on grocery store items are also called Universal Product Codes and provide information about the brands and costs of the items.

A DISK DRIVE

A disk drive is an input device. The disk drive (with a floppy disk inserted) loads a program into the computer.



OUTPUT DEVICES

out-put ➡ put out

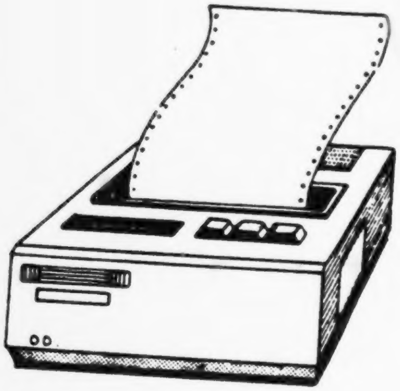
An output device puts out the information it has processed. (The result of the processing is called output.) Output can be printed, displayed, stored, or take other special forms.

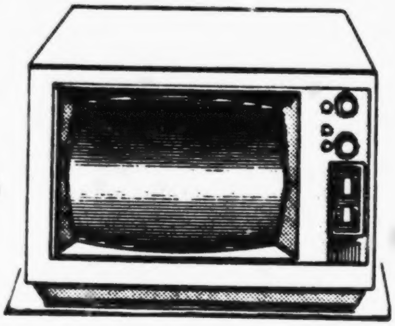
PRINTER

A printer provides a printed page of a computer's output or answers. This is called "hard copy." There are many types of printers and they vary in the speed at which they print, the way they print characters on a page, and their cost.

Examples of Printers:

- Low-speed printers are character printers. They print one letter or numeral at a time. They are the least expensive and produce fewer than 300 lines of copy a minute.
- High-speed printers are called line printers. They print entire lines of copy at a time. High-speed printers produce 300 to 3,000 lines a minute with super high-speed printers producing over 3,000 lines a minute. High-speed printers can be very expensive but can print many reports or bills in a short time.
- An electrographic non-impact printer prints characters on a page without using keys to hit the page. (Some of these printers burn the characters onto special paper.)





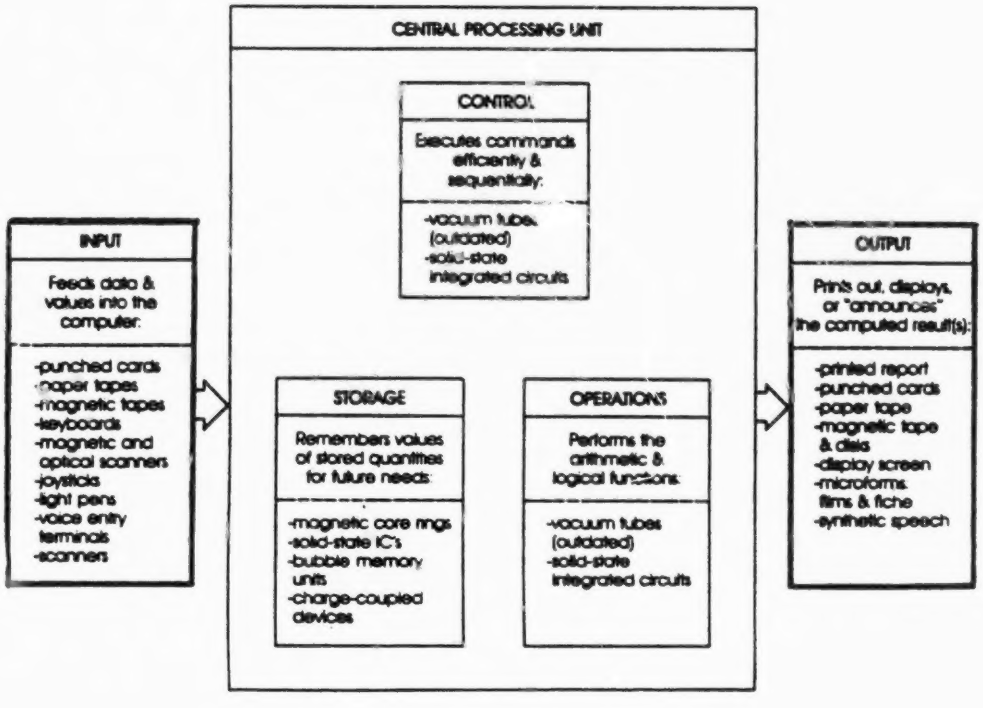
VIDEO SCREEN

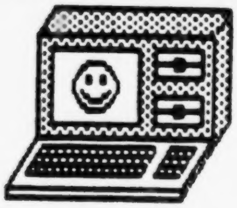
The most common output device on microcomputers is the video screen, sometimes called a Cathode Ray Tube (CRT), or a monitor.

INPUT/OUTPUT DEVICES

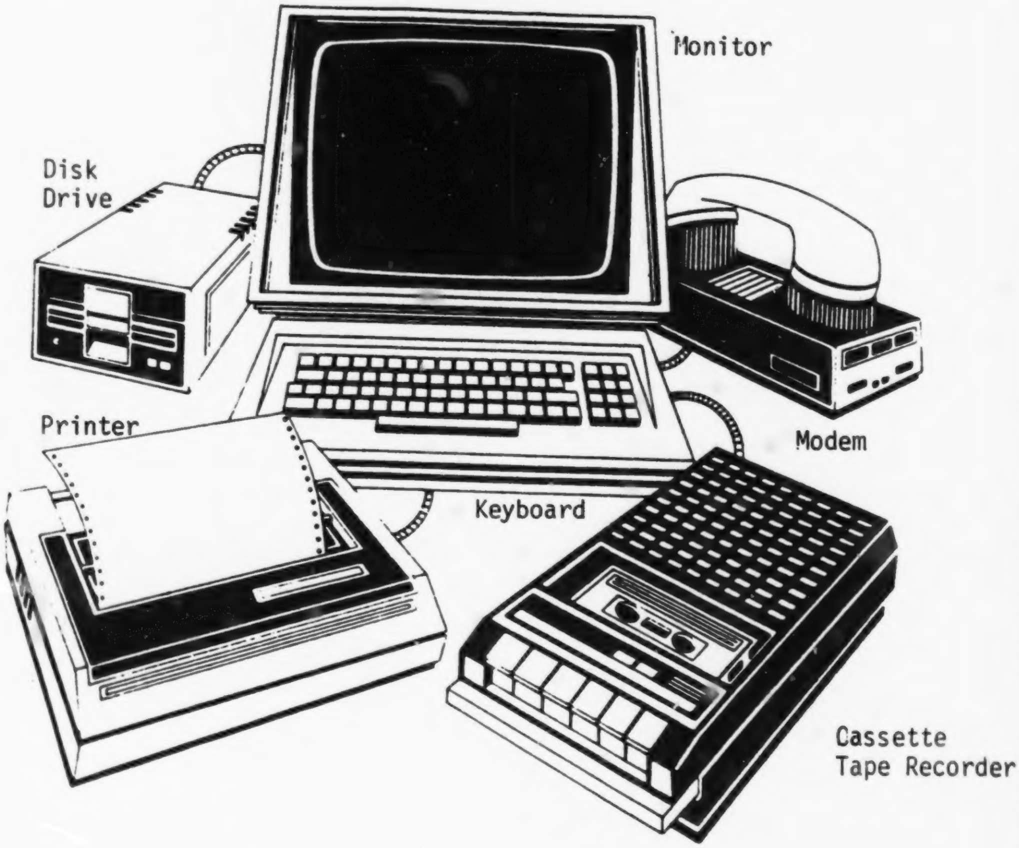
Peripheral devices that do the jobs of both input and output are known as input/output devices, or I/O devices.

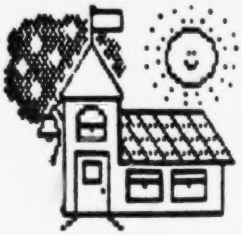
A COMPUTER SYSTEM AND ITS FUNCTIONS


CENTRAL PROCESSING UNIT
CONTROL
Executes commands efficiently & sequentially:
-vacuum tubes (outdated)
-solid-state integrated circuits
INPUT
Feeds data & values into the computer:
-punched cards
-paper tapes
-magnetic tapes
-keyboards
-magnetic and optical scanners
-joysticks
-light pens
-voice entry terminals
-scanners
STORAGE
Remembers values of stored quantities for future needs:
-magnetic core rings
-solid-state IC's
-bubble memory units
-charge-coupled devices
OPERATIONS
Performs the arithmetic & logical functions:
-vacuum tubes (outdated)
-solid-state integrated circuits
OUTPUT
Prints out, displays, or "announces" the computed result(s):
-printed report
-punched cards
-paper tape
-magnetic tape & disks
-display screen
-microforms, films & fiche
-synthetic speech



THE HARDWARE COMPONENTS


Monitor
Disk Drive
Printer
Modem
Keyboard
Cassette Tape Recorder



MEMORY

The computer has two kinds of memory. Computers need both kinds of memory to function properly.

1. Random Access Memory (RAM) stores the programs and data you enter into the computer. RAM never forgets the information it is storing as long as the computer is turned on. RAM is temporary memory.

2. Read Only Memory (ROM) is permanent memory because its programs are always in the memory whether the computer is turned on or off. You cannot make changes in the programs in ROM. ROM programs usually put special symbols on the screen such as the cursor, display error messages when necessary, or translate BASIC into the computer's "own" language of binary numbers.

RAM **Random Access Memory**	**ROM** **Read Only Memory**
temporary memory	permanent memory
It stores programs you write.	It stores programs built into the memory when the computer is built.
You can make changes in the programs it stores.	You cannot make changes in the programs it stores.

CENTRAL PROCESSING UNIT

The "brain" of the computer is the Central Processing Unit (CPU). The CPU carries out the instructions it is given. The CPU has two parts:

- The arithmetic unit and
- The control unit

The Arithmetic Unit is the part of the computer system that does the calculations. The arithmetic unit can only add and compare numbers. The Arithmetic Unit can also subtract, divide, multiply, etc., but it does all of these calculations by changing each problem into an additional problem. For instance:

7 x 4 would be 4 + 4 + 4 + 4 + 4 + 4 + 4

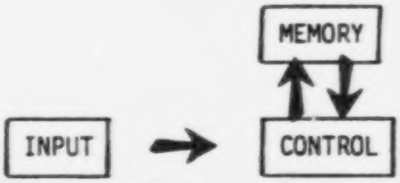
The computer does its multiplication by repeated addition, but it takes the computer practically no time at all.

The arithmetic unit also compares numbers and is sometimes called the logic unit. For example, if the computer asked you what 7 x 4 equaled and you put 26, the computer would compare "26" to "28" the right answer and probably tell you, you were wrong.

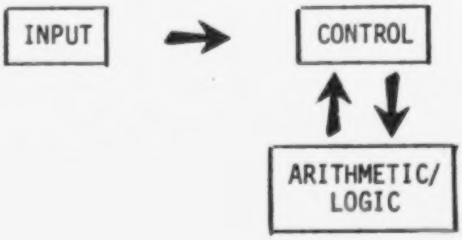
Another example of the arithmetic/logic unit is when a police officer runs a check for a stolen car. The policeman would call in the car's license plate number to headquarters to be entered into a computer terminal. The computer compares that number to the numbers of license plates from stolen cars that it has stored in its memory. If one of the numbers is a "match," the computer then prints out any information to headquarters, who then relays that information to the policeman.

The Control Unit

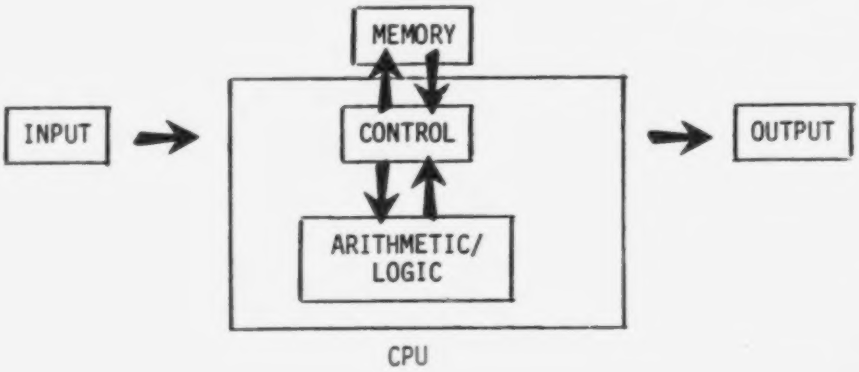
The control unit directs the flow of that information through the computer. The CU sends information to the memory to be stored. It also takes information needing to be processed from the memory



The CU sends information to and from the arithemtic/logic unit to be calculated and compared.

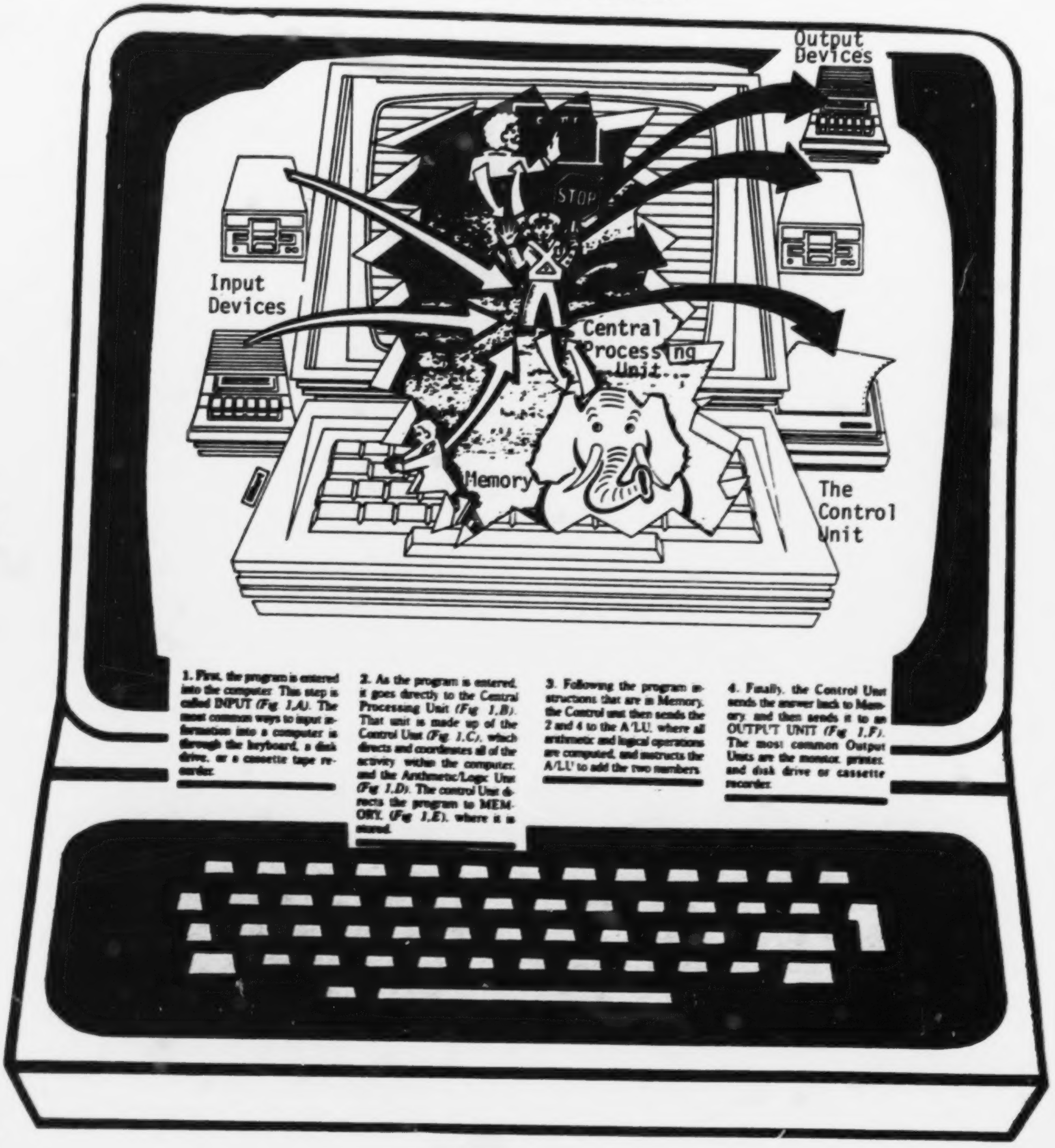

INPUT
CONTROL
ARITHMETIC/ LOGIC

Then it sends the processed information to an output device to be displayed.


MEMORY
INPUT
CONTROL
OUTPUT
ARITHMETIC/ LOGIC
CPU

DID YOU KNOW??

HOW A COMPUTER WORKS



1. First, the program is entered into the computer. This step is called INPUT *(Fig. 1,A)*. The most common ways to input information into a computer is through the keyboard, a disk drive, or a cassette tape recorder.

2. As the program is entered, it goes directly to the Central Processing Unit *(Fig. 1,B)*. That unit is made up of the Control Unit *(Fig. 1,C)*, which directs and coordinates all of the activity within the computer, and the Arithmetic/Logic Unit *(Fig. 1,D)*. The control Unit directs the program to MEMORY, *(Fig. 1,E)*, where it is stored.

3. Following the program instructions that are in Memory, the Control unit then sends the 2 and 4 to the A'LU', where all arithmetic and logical operations are computed, and instructs the A/LU' to add the two numbers.

4. Finally, the Control Unit sends the answer back to Memory, and then sends it to an OUTPUT UNIT *(Fig. 1,F)*. The most common Output Units are the monitor, printer, and disk drive or cassette recorder.

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BITS AND BYTES

The insides of computers are made up of computer chips. A computer chip looks like a piece of black plastic with metal pins coming out of it. The computer chips all fit into a computer circuit board.

A circuit is a path through which electricity flows. On one chip there are many circuits. These circuits are interconnected with one another and are called integrated circuit chips. For every circuit on a computer chip:

(1) An electric current flows through the circuit ON or

(2) An electric current does not flow through the circuit OFF .

An "ON" circuit is the number 1; the "OFF" circuit is 0. The computer uses only 0 and 1 when doing its calculations and processing. The prefix bi means two, so that the binary number system means "two" (0 and 1). 0 and 1 are called bits.

BINARY DIGIT ➡ BIT

Every time the computer "reads" an instruction, it translates the instructions into a series of bits. In most computers, every letter, number and symbol is translated into eight bits which is called a byte. A byte is eight binary digits; that is, eight bits, or eight 0's and 1's. Each byte tells the computer what to do with its circuits -- whether to turn them "ON" or "OFF". Each letter, number, etc., has a set combination to use in the computer.

EXAMPLE:

This is a bit	0
This is a bit	1
This is a byte	01010010

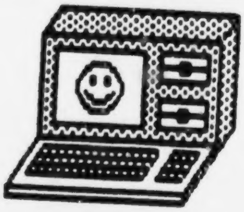
The letter R is 01010010.

It means that the circuits are:

OFF	ON	OFF	ON	OFF	OFF	ON	OFF
0	1	0	1	0	0	1	0

Computer memories are measured in bytes. Some computers are advertised being 16K, 32K, or 64K. This means your computer can store approximately 16,000 bytes of information in its memory (RAM). (Each byte represents one character, such as a letter or number.)

K stands for "Kilo," or one thousand; so 16K stands for 16,000.



INSIDE A COMPUTER

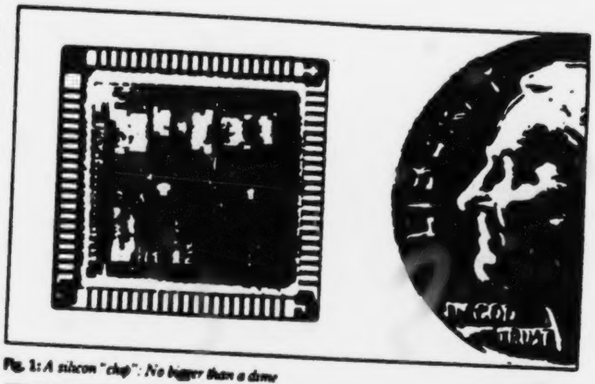


Fig. 1: *A silicon "chip": No bigger than a dime*

Overview: The "real" computer in any microcomputer system is actually no bigger than a dime. (*Fig. 1*). It consists of thousands of transistors (electronic on/off switches) which, through the miracle of microphotography, have been squeezed onto a slice or "chip" of silicon. This chip, which is encased in a rectangle of plastic, is called a microprocessor.

Although there are other chips within a microcomputer, the microprocessor has features that set it apart from all the others. These features include a Control Unit, which handles or controls the operation of all of the computer's parts, and an Arithmetic/Logic Unit, where arithmetic and logical operations are performed. As such, the microprocessor is the Central Processing Unit (CPU) of a computer (*Fig. 2, A*).

The other chips within a microcomputer perform other specific functions. One group provides a space, called memory, where information that is to be used by the computer is stored. These memory chips (*Fig. 2, B*) are known as Random Access Memory (RAM).

Another group of memory chips provides a place where certain information is stored permanently. This information is built into the computer by the manufacturer and includes such things as instructions that translate the computer language BASIC into the only language a computer can understand, called machine language. These chips (*Fig. 2, C*) are known as Read Only Memory (ROM).

All of these chips plug into a plastic board called a mother board (*Fig. 2, D*), which provides an interconnecting network for them.

There are also additional Input/Output ports (*Fig. 2, E*) which electronically connect computer peripherals (or accessories) to the CPU.

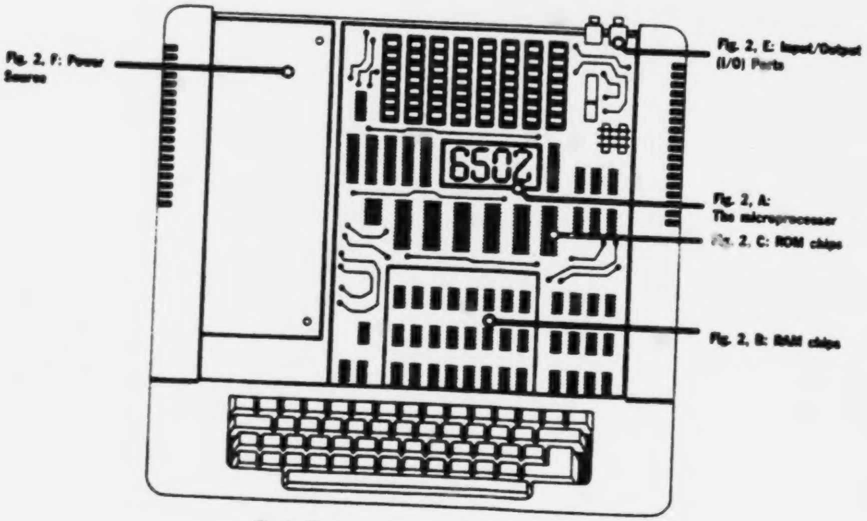


Fig. 2: *The "inside" of an Apple II micro computer*

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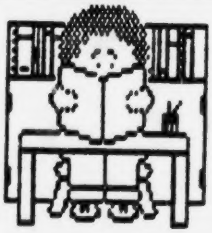


WORDS TO KNOW

Arithmetic/logic Unit - One of the two main parts of the central processing unit that does calculations and compares numbers.

Bit - A binary digit, 0 or 1, used to represent the "off" or "on" state of an electric circuit. It is the smallest unit of digital information a computer processes.

Byte - A unit usually made up of 8 bits. One byte represents one character on the computer keyboard.

Card Reader - An input device that transfers data from punched cards to the computer's memory.

Cassette Tape - A strip of magnetic material on which computer programs are stored in the form of magnetic impulses. Used with a tape recorder as an I/O device for microcomputers.

Central Processing Unit (CPU) - The part of a computer system that processes information. Its two main parts are the arithmetic/logic unit and the control unit.

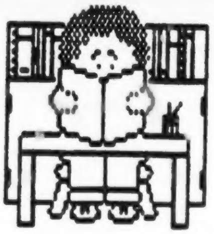
Computer - A machine designed to accept information, store information, process information, and give out processed information.

Control Unit - One of the two main parts of the central processing unit. It directs the flow of information through a computer system.

Data - Information. Also refers to information that is to be input or information that is the output of a program.

Disk - A flat, circular device with a magnetic surface that is capable of storing computer programs. Some disks are flexible (floppy disk) and some are hard (hard disk).

Disk Drive - An input/output device that loads a program or data stored on a disk into a computer.



Hard Copy - Paper output (printout) from a printer.

Hardware - Computer machinery.

Input Device - Part of a computer system that puts information into the computer's memory.

Input/output Device (I/O) - A device that functions as an input and an output device.

Keypunch Machine - A machine used to punch holes in cards, which are used for computer input.

Mainframe Computer - A large computer system that can handle many jobs at once.

Memory - The part of a computer system that stores information.

Microcomputer - A small desktop computer that can do one job at a time. (Home computer.)

Minicomputer - A medium-size computer system which can do several jobs at once.

Optical Mark Reader - An input device that reads pencil markings on paper.

Output Device - The part of the computer system that displays, prints, or records the results.

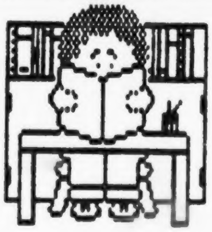
Peripheral Equipment - Hardware, such as tape recorder or printer, that is connected to the main computer.

Plotter - An output device that draws pictures and graphs on paper.

Punched Card - A paper card containing holes that stand for data or programs.

Random Access Memory (RAM) - The computer's temporary memory. It stores data and programs that are input.

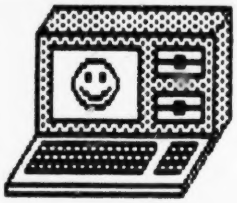
Read Only Memory (ROM) - The computer's permanent memory.



Simulation - A computerized output which imitates a real-life situation.

Tape Recorder, Tape Drive - Input/output devices.

Terminal - An I/O device that has a keyboard for input and either a video screen or a printer for output. It is connected to a mainframe or minicomputer.



THESE QUESTIONS WILL BE ON YOUR POSTTEST. CAN YOU ANSWER THEM NOW?

A computer:

- a. Accepts information
- b. Stores information
- c. Processes information
- d. All of the above

Computer data is stored in:

- a. Memory
- b. The keyboard
- c. The screen
- d. Input

Information processed by a computer is called:

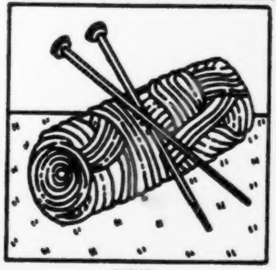
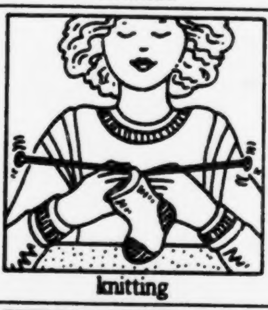
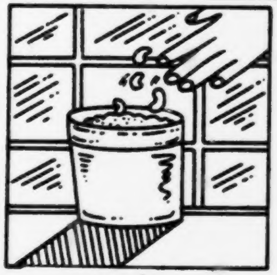
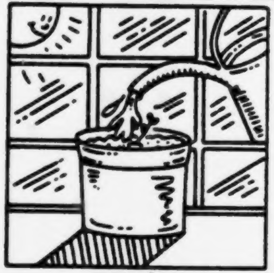
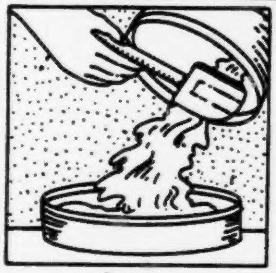
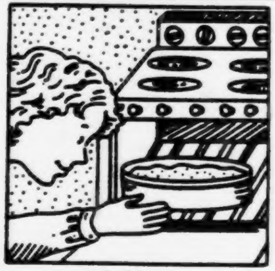
- a. Floppy disk
- b. Printout
- c. Hardware
- d. Data

Choose the true statement:

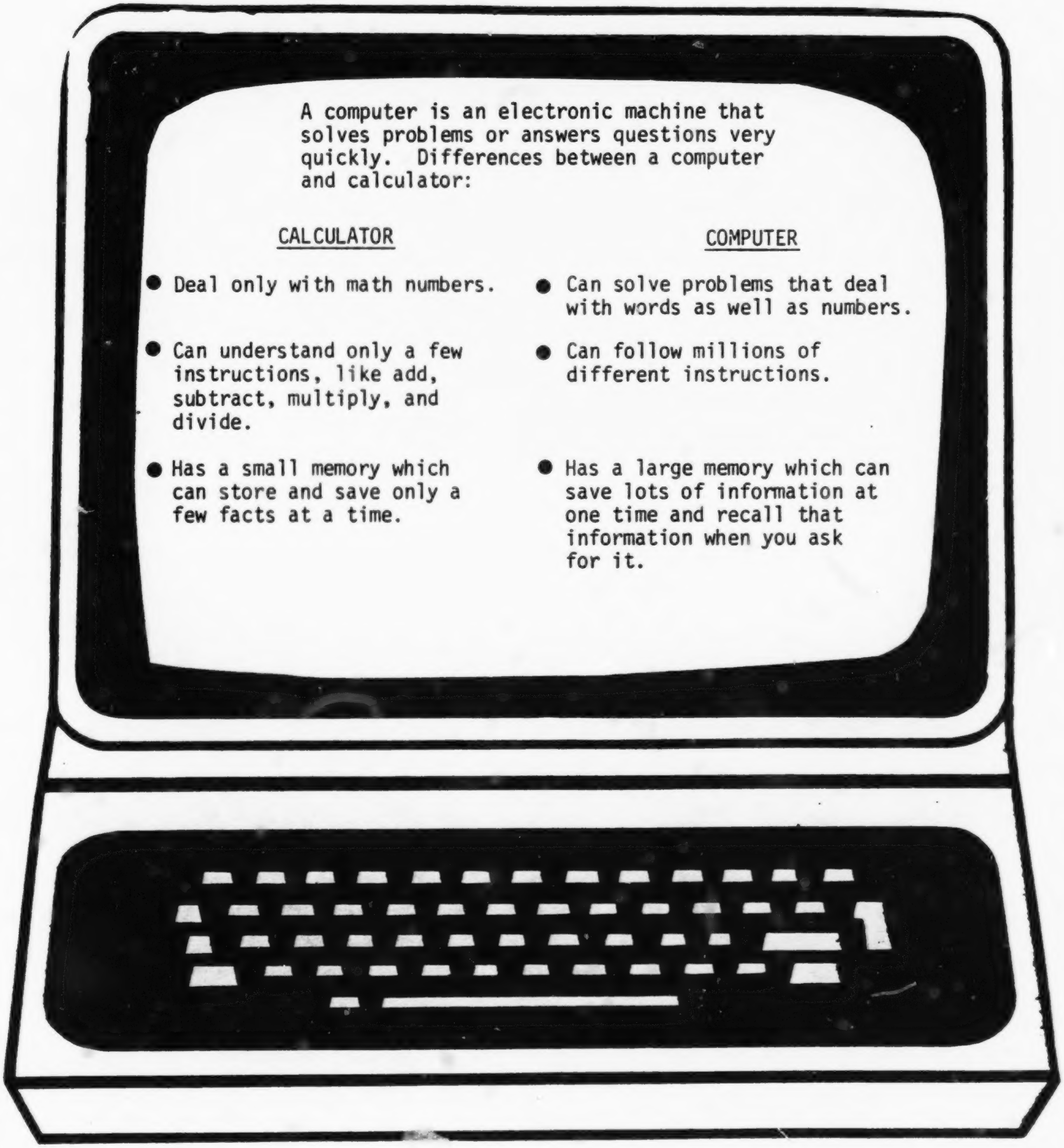
- a. Computers need instructions to work
- b. Computers have brains
- c. Computers are smarter than humans
- d. All of the above

What Is a Process?

A process turns input into output.
What would be the output for each?

Input	Process	Output
 yarn	 knitting	
 seeds	 watering	
 batter	 baking	

DID YOU KNOW??



A computer is an electronic machine that solves problems or answers questions very quickly. Differences between a computer and calculator:

CALCULATOR	COMPUTER
● Deal only with math numbers.	● Can solve problems that deal with words as well as numbers.
● Can understand only a few instructions, like add, subtract, multiply, and divide.	● Can follow millions of different instructions.
● Has a small memory which can store and save only a few facts at a time.	● Has a large memory which can save lots of information at one time and recall that information when you ask for it.

COMMUNICATING INSTRUCTIONS TO THE COMPUTER

FLOWCHARTS

ALGORITHMS

TEA's
ESSENTIAL ELEMENT

Communicating Instructions to the Computer

A. Use and develop flowcharts and top-down design as a means of expressing algorithms.

   1. Use flowcharting to express simple algorithms for sequential process, decision making, and looping.

   2. Plan a program algorithm using top-down design methodology requiring more than one level of refinement.

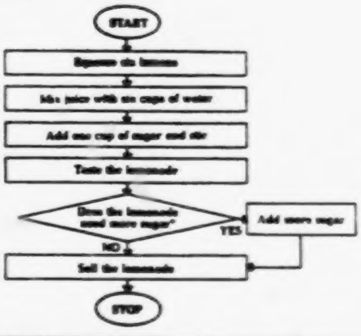
Flowcharting

Overview - This section is designed to introduce the participants to the concept of flowcharting and how to use this concept to strengthen skills in sequencing and logical thinking. Participants will become familiar with standard symbols and terminology.

Learner Outcomes - The participant will:

- Demonstrate logical order and thinking and the process of writing steps of a computer program by developing flowcharts using daily situations or activities which are familiar to students or participants.
- Develop flowcharts showing steps to solve problems.
- Become familiar with standard flowcharting symbols and terms to facilitate reading them.

"Top-down" design is a problem solving strategy in which the designer considers the whole problem, divides it into a few general sub-problems, and then as long as necessary continues to subdivide these sub-problems into more specific sub-problems.


START
Squeeze six lemons
Mix juice with six cups of water
Add one cup of sugar and stir
Taste the lemonade
Does the lemonade need more sugar?
YES
Add more sugar
NO
Sell the lemonade
STOP

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SOLVING PROBLEMS WITH COMPUTERS

There are many problems that a person must solve every day.

- * Problem: Your car has a flat tire.

  Solution: You take the spare tire from the trunk, jack up the car, take off the flat tire, and put on the spare tire.

- * Problem: You want to listen to a new record you just bought.

  Solution: You turn on the stereo, put the record on the turntable, and put the needle on the record.

These problems may not seem like real problems because most of us know how to easily solve them. However, what if you had never seen a stereo, or didn't know what a spare tire was, or where it was? How would you go about solving these problems?

UNDERSTANDING A PROBLEM

In order to solve a problem, you must do two things:

(1) You must clearly define the problem.

(2) You need to develop a plan for solving the problem.

The way to solve problems can be used both in your everyday life as well as on the computer.

What's the problem

Before you plan a solution to a problem, you must think of all the questions you may have to answer, what you want the outcome of the problem to be, and what things or information you will need to help you reach your goal.

Suppose you're hungry and you want to make a hamburger. Here is how you might define or outline your problem:

What is the problem?

I am hungry and want a hamburger.

What result do I want?

I need to cook a hamburger so I can eat ~~it.~~ —

What will I need to help solve the problem?

I need hamburger meat, a cookbook, a skillet, and other things to make a hamburger.

This may seem like a lot of steps to define what you need to do, but it will help you develop a plan for solving the problem.

Solving the problem

Once you have defined your problem and know what you need and want, you should plan the solution step-by-step. A step-by-step plan for solving a problem is called an *algorithm*. Algorithms are used to solve everyday problems or problems to be solved on the computer.

The plan (algorithm) you develop should be logical. A logical way of doing something is a way that makes sense. Putting ketchup on the hamburger before it is cooked is not logical. An algorithm or logical step-by-step plan for making a hamburger would look like this:

- Buy hamburger meat and other ingredients needed.
- Put raw hamburger into a patty.
- Put pan on stove, turn on burner.
- Fry hamburger patty in hot fry pan.
- Keep frying hamburger meat until it is done.
- Put fried hamburger meat onto hamburger bun.
- Put ketchup, mustard, lettuce, cheese on the hamburger or bun.
- Put top of bun on hamburger, pick up hamburger, and eat it.

The algorithm should be as detailed and complete as possible. What would have happened if you didn't cook the hamburger meat before you ate it?

Once you develop a logical plan or algorithm, it helps to draw a picture of it.

Pretend that you have a robot which can understand your commands. At breakfast you say to your robot, "Pour some milk, please." Your robot picks up the milk and pours it -- all over the table! Your instructions were not exact. You should have said, "Pour some milk into the glass. Stop when the glass is full."

A computer is like a robot. You must tell it:

- What to do.
- What steps to follow.
- In what order to follow the steps.

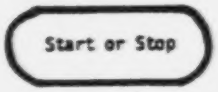
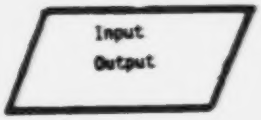
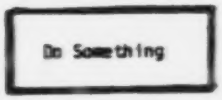
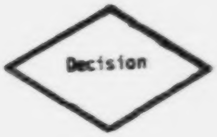
If you leave out a step, or put a step out of order, the computer will not understand what it should do.

USING FLOWCHARTS

A flowchart is a picture of your plan to solve a problem on the computer. A flowchart is like a map. It shows both the steps a computer will follow to solve a problem, and the order in which the computer will follow these steps.

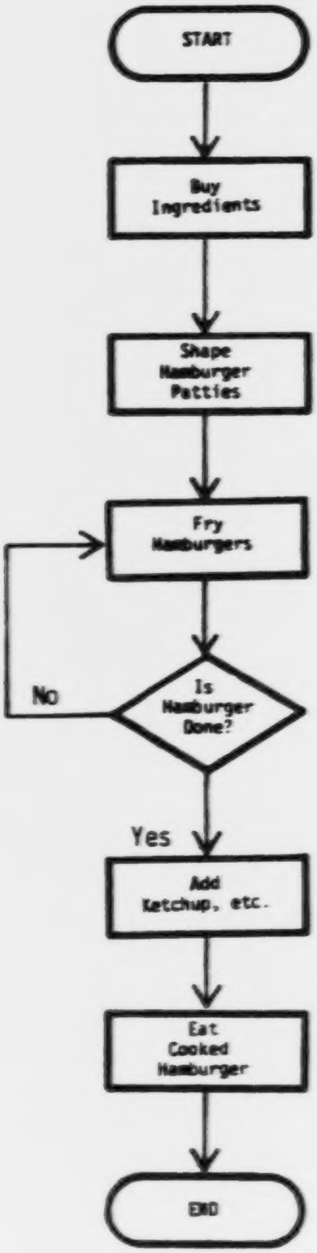
A flowchart is made up of special shapes or symbols. Each shape has a special meaning. The shapes are connected by arrows to show which action follows which.

The four shapes most used in flowcharts are:

Oval		Used to show where program begins and ends.
Parallelogram		Used to show that something is to be put in, or that there will be output.
Rectangle		The rectangle stands for a direct order. It's used to tell the computer to do something.
Diamond		The diamond tells the computer it must make a decision or answer a question. The decision or answer the computer makes will help determine what its next step should be.

These shapes are connected with arrows. They show the order or sequence of the steps.

Each shape is used to map out the steps of the algorithm. A flowchart showing the plan to cook and eat a hamburger would look like this:


START
Buy Ingredients
Shape Hamburger Patties
Fry Hamburgers
Is Hamburger Done?
No
Yes
Add Ketchup, etc.
Eat Cooked Hamburger
END

Flowcharts often have a step--or a section of several steps--that can be repeated over and over. A section that can be repeated is called a loop.

Notice that we have to make a decision ◇ on whether the hamburger is done. If it is, we can continue down the flowchart; if it is not done, we have to loop around to cook the hamburger some more.

Once the solution to the problem is mapped out, it can be written as a computer program. A program is a set of instructions for the computer. A person who codes a program is called a programmer. Programmers make flowcharts to help them organize their ideas when they begin working on a new program.

Remember: A key concept in algorithmic thinking is mentally following an algorithm or procedure, checking its correctness and trying to detect errors. Computer scientists call an error a bug. The detection and correction of errors is called debugging.

EXAMPLES OF DIFFERENT WAYS TO SOLVE PROBLEMS

OUTLINE EXAMPLE

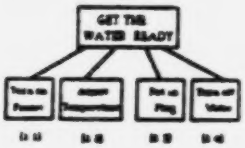
Problem: How to take a bath.

Solution:

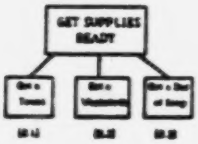
- **1. Get the water ready**
  - **1.1 Turn on faucet in tub**
  - **1.2 Adjust temperature**
  - **1.3 Put in plug**
  - **1.4 Turn off water**
- **2. Get supplies ready**
  - **2.2 Get a towel**
  - **2.2 Get a washcloth**
  - **2.3 Get soap**
- **3. Take the bath**
  - **3.1 Get in tub**
  - **3.2 Wash body**
  - **3.3 Rinse body**
  - **3.4 Get out**
- **4. Finish up**
  - **4.1 Dry body**
  - **4.2 Pull plug**

TOP-DOWN DESIGN

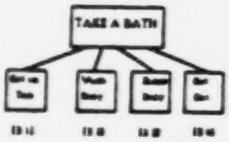
(1)


GET THE WATER READY

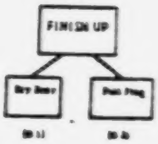
(2)


GET SUPPLIES READY

(3)



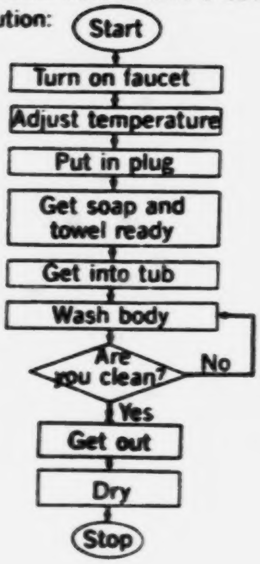
(4)



FLOWCHART EXAMPLE

Problem: How to take a bath.

Solution:


Start
Turn on faucet
Adjust temperature
Put in plug
Get soap and towel ready
Get into tub
Wash body
Are you clean?
No
Yes
Get out
Dry
Stop

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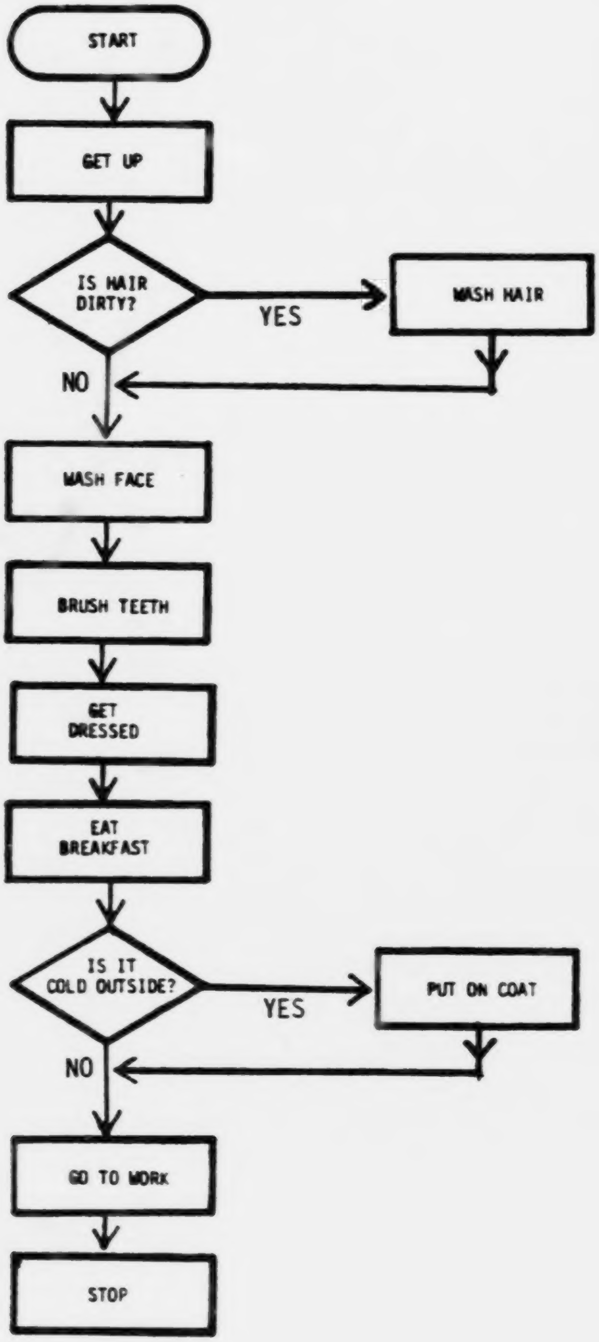
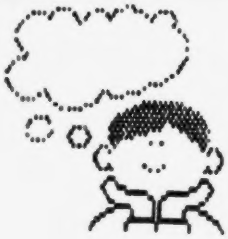
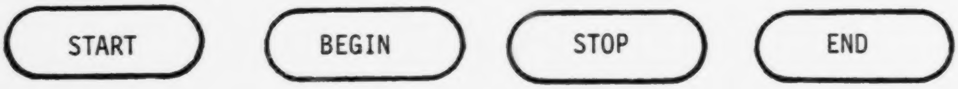
SAMPLE FLOWCHARTS


START
GET UP
IS HAIR DIRTY?
YES
WASH HAIR
NO
WASH FACE
BRUSH TEETH
GET DRESSED
EAT BREAKFAST
IS IT COLD OUTSIDE?
YES
PUT ON COAT
NO
GO TO WORK
STOP

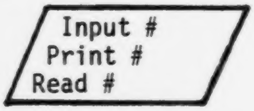


Remember

Terminal operations -

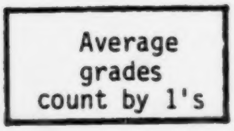

START
BEGIN
STOP
END

Input/Output operations -


Input #
Print #
Read #

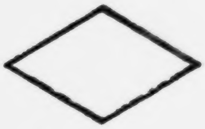
A parrallelogram is used to symbolize that data from an outside source is to be input or that processed data is to be output.

Process or Definition Operation -

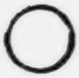

Average
grades
count by 1's

A rectangle is used to state processing operations or to define variables.

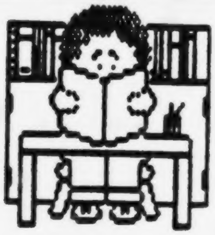
Decision Operation -



Connector -



A small circle is used to connect one portion of a flowchart diagram to another.



WORDS TO KNOW

Algorithm.	A step-by-step plan for solving a problem.
Arrow.	An arrow points from one step to the next.
Computer.	An electronic tool that helps us do many tasks faster and easier than would be possible by hand.
Diamond.	A flowchart symbol indicating where a decision will be made in a program.
Flowchart.	A diagram (picture) showing the order of steps in a computer program.
Loop.	A series of steps that a computer repeats for the number of times you specify.
Oval.	A flowchart symbol indicating where a program begins or ends.
Parallelogram.	A flowchart symbol showing where input will occur in a program.
Program.	A set of instructions telling the computer to perform a certain task.
Programmer.	A person whose job it is to write instructions telling a computer how to solve problems.
Rectangle.	A flowchart symbol indicating where a computer must act on data.
GIGO (Garbage In/ Garbage Out).	Errors in logic, that result in errors in input, that result in errors in output or no output at all.

SOLVING A PROBLEM

1. What are the first two steps in solving a problem?

2. What words means "a step-by-step plan for solving a problem?"

3. What flowchart symbol is used to show:
    - A decision must be made in the program?

    - The beginning or end of the program?

4. What word means "a set of instructions for the computer?"

ACTIVITY

Making a peanut butter and jelly sandwich. Tell your students that they must write a set of directions for making a peanut butter and jelly sandwich. The directions are to be very detailed, designed to be read and followed by a person who has never made or even seen a peanut butter and jelly sandwich. Each student is to write a set of directions. As soon as students complete their directions, collect them. Quickly glance through them to find one with some serious flaws. Hand this set of directions to a student who reads the instructions one step at a time for you to follow. The reader must read precisely what is on the sheet, and you must follow these instructions. You are not allowed to use "common sense" to fill in gaps or avoid disaster.

For example, suppose that an instruction specifies, "Put the peanut butter on a slice of bread." You could pick up the jar of peanut butter and set it on a slice of bread. If the directions say, "Take some peanut butter out of the jar and spread it on a slice of bread," you might scoop a handful of peanut butter out of the jar with your hands and spread it on the slice of bread.

The point is, it is very difficult to write an exact set of directions. One must understand precisely what the person or machine who will follow the directions is able to understand and to do.

ACTIVITY

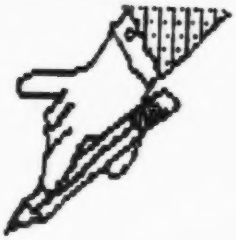
Students can read other students' directions for making the sandwich and detect "bugs" in the set of directions and write suggestions for improvement.

ACTIVITY

Programming. When writing a new set of instructions for the peanut butter sandwich, students will see the need to write the new instructions between the lines of the original instructions. One way is to number the original set of directions 10, 20, 30, etc. and then allow new instructions such as "Open the jar of peanut butter" to use the in-between numbers.

ACTIVITY

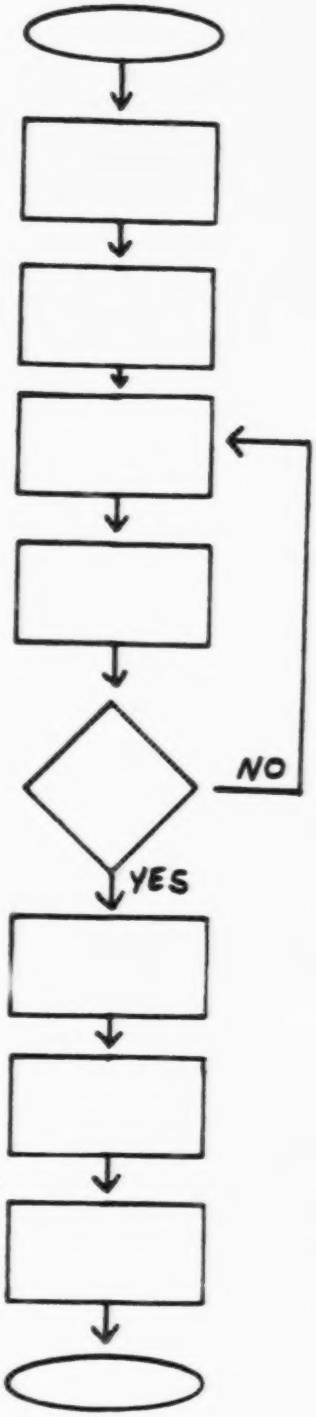
Show students a simple computer program written in BASIC. Follow through the program steps, explaining how each program statement has precisely one meaning to the computer.



MAKING A SANDWICH

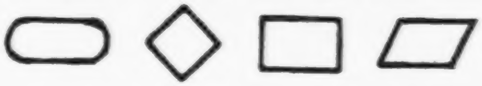
Put the numbers of the following steps in the proper symbol.

1. Stop
2. Cut sandwich in half
3. Place piece of bread on plate
4. Dip knife into mustard jar
5. Place bologna on bread
6. Is second piece of bread covered with mustard?
7. Pick up knife
8. Place mustard side of bread on top of bologna
9. Pick up three pieces of bologna
10. Start
11. Spread mustard side of knife on bread



CREATE A FLOWCHART

Make a flowchart for cooking an egg. Use the following steps in your flowchart. Use these symbols:



1. Get out egg
2. Get out pan and turner
3. Put grease in pan
4. Turn on stove
5. Break egg
6. Is the yolk broken?
7. Scramble egg
8. Hard fry egg
9. Is egg burned?
10. Start over
11. Put egg on plate
12. Eat egg

Remember to include the start and stop steps.

FLOWCHART ACTIVITY

You want to write a program that will tell your robot to pour some milk into a glass without letting it overflow. Here are the robot's orders, but they are out of order. First, label the steps 1-6, then place them in the correct boxes in the flowchart diagram.

______ Is the glass full?

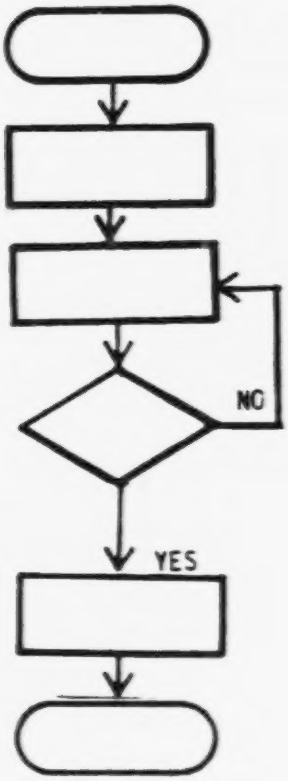
______ Pick up the carton of milk.

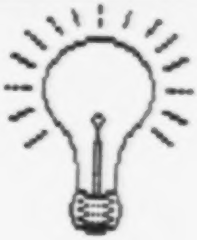
______ Start.

______ Stop.

______ Pour the milk into the glass.

______ Put the carton down on the table.





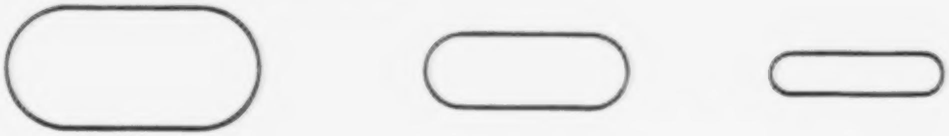
Additional Activities

- Write instructions for programming a robot to do a simple household chore.
- Use either flowcharts or top-down designs to describe the following processes (algorithms).
    - Placing a phone call
    - Mowing the yard
    - Making a batch of cookies
    - Loading a diskette into the computer
    - Planting a garden
    - Washing the dog
    - Wrapping a present
    - Making a sandwich
- Illustrate the meaning of a logical sequence by putting single words on cards for students to put in a meaningful sentence order. Display pictures of an activity or process for students to put in a meaningful order.

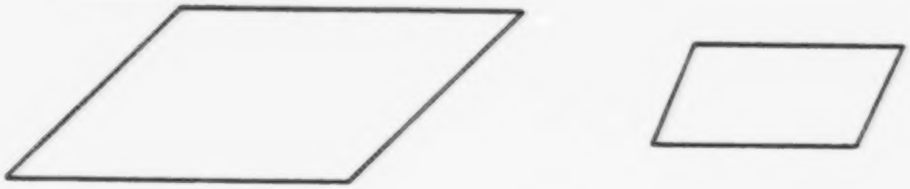
FLOWCHART TEMPLATE

(Different Sizes)

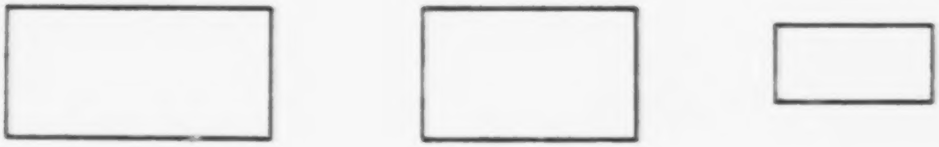
TERMINATORS (START/STOP)



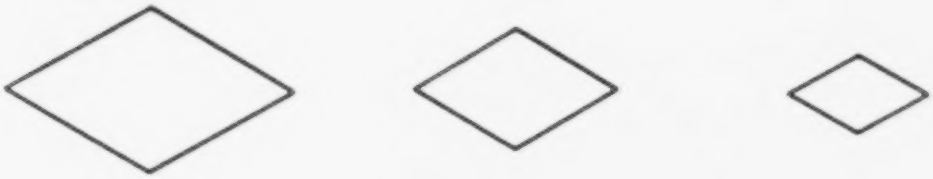
INPUT/OUTPUT



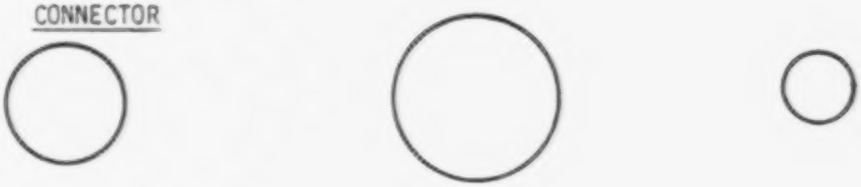
PROCESS



DECISIONS



CONNECTOR



HOW TO USE A COMPUTER

KEYBOARDING

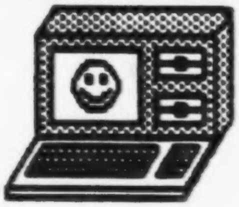
OPERATING THE COMPUTER

TEA's
ESSENTIAL ELEMENT

USE OF THE COMPUTER AS A TOOL

A. Develop sufficient keyboarding skills for use of commercial software.

   1. Demonstrate effective use of numeric and alphabetic keys.
   2. Identify and use special purpose keys.



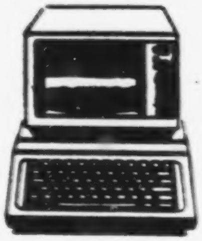
KEYBOARDING

Knowing how to use the computer keyboard is an important prerequisite skill to the use of the computer.

The term "keyboarding" implies the use of the following skills such as:

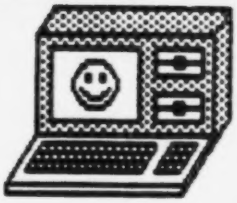
- Proper finger placement and technique,
- Familiarity with the function of nonstandard keys, such as ESC, control, delete, return or enter, reset, cursor, and others,
- The ability to use the backspace key to delete and replace characters mistyped,
- Sufficient typing speed.

The keyboard is one kind of input device. It is one way to put information or a program into a computer.



The computer keyboard is similar to a typewriter keyboard. The keys are not in alphabetical order. The number keys are on the top row and some keys have special symbols on top. You will need to hold down the shift key to type these special symbols.

Not all computer keyboards are the same. Some computer keyboards also have a number keyboard on the right side of the keyboard.



All keyboards have a "SPACE BAR." It is a long bar below the bottom row of keys. Every time you press the space bar, the computer prints a blank space on the screen.

All keyboards have either a "ENTER" or "RETURN" key. This key "enters" the instructions of your program into the computer's Random Access Memory. You must press this key each time you finish typing an instruction.

You'll know where you can start typing on the screen by looking at the "prompt" or "cursor". The prompt is a symbol (> or]) that means the computer is waiting for you. The cursor (■ or —) shows where the next character will appear on the screen as you type.

DID YOU KNOW??

TYPEWRITER KEYBOARD

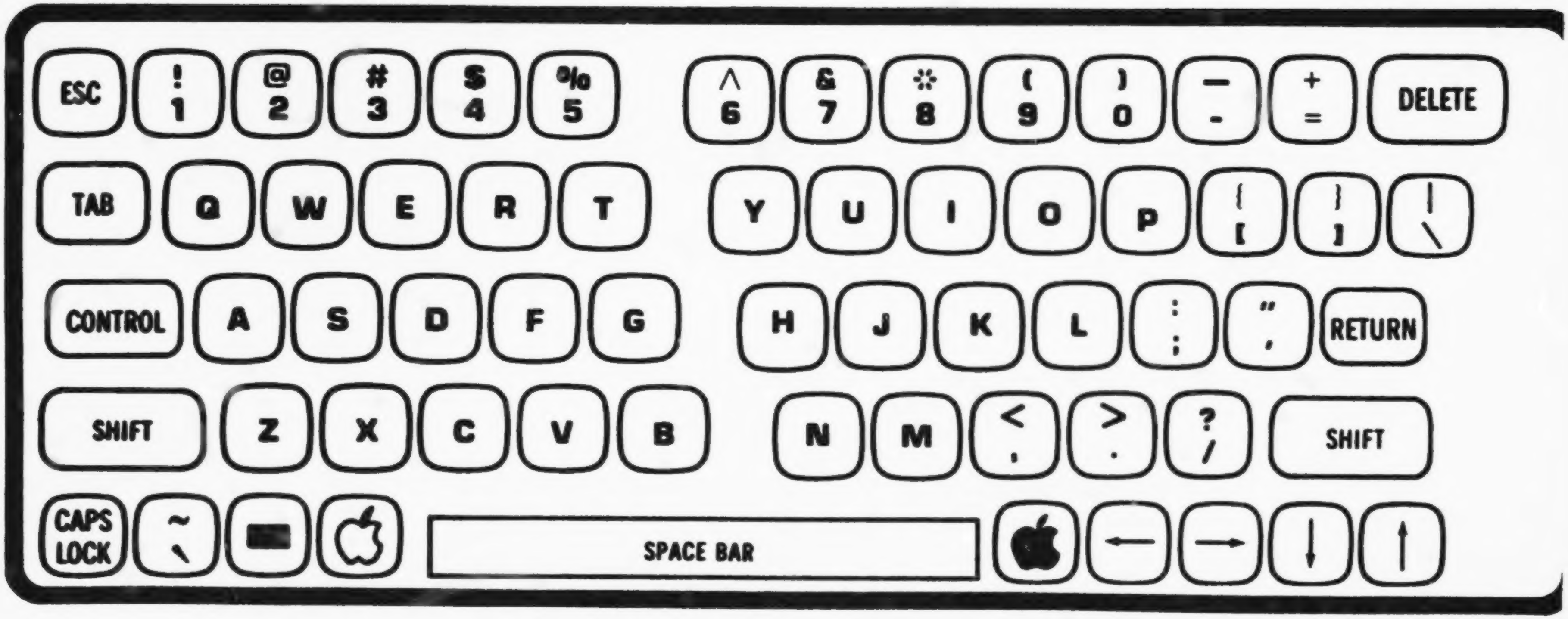
The standard typewriter keyboard was designed to slow down the typist.

When the typewriter was first invented in 1872 whenever a typist worked up any speed the keys would jam. To remedy this, the typewriter inventor, Christopher Sholes, rearranged the keyboard, positioning frequently used letter combinations as far from each other as possible and assigning a disproportionate amount of work to the weakest fingers. His "improvements" slowed the typists down but largely eliminated the jammed-key problem.

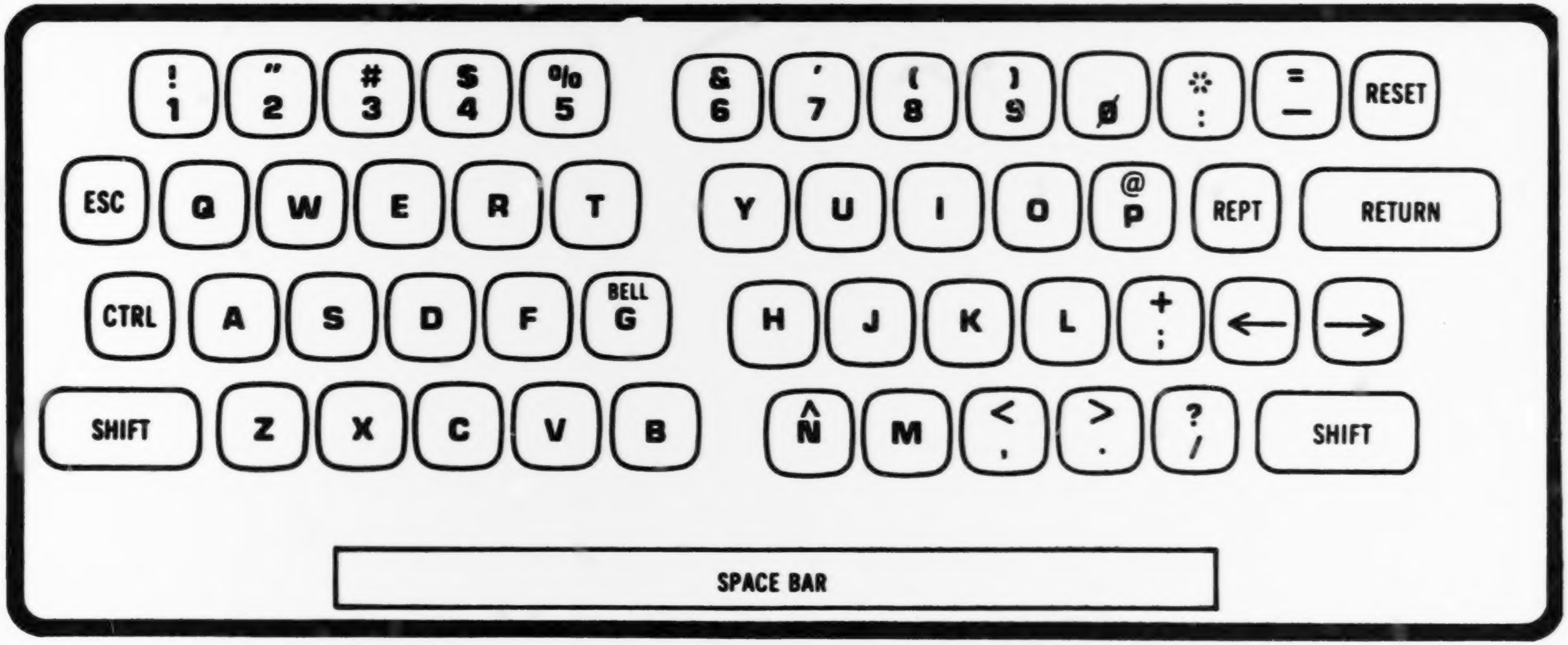
Look at the computer keyboard you will be using and see if you can find the following keys. (Not all keyboards will have the same keys.)

DELETE
RETURN
SHIFT
TAB
ESC
CONTROL (CTRL)
CAPS LOCK
SPACE BAR
NUMBERS
ARROWS
RESET
CLEAR
HOME
ENTER
BREAK
FUNCTION (FCTN)

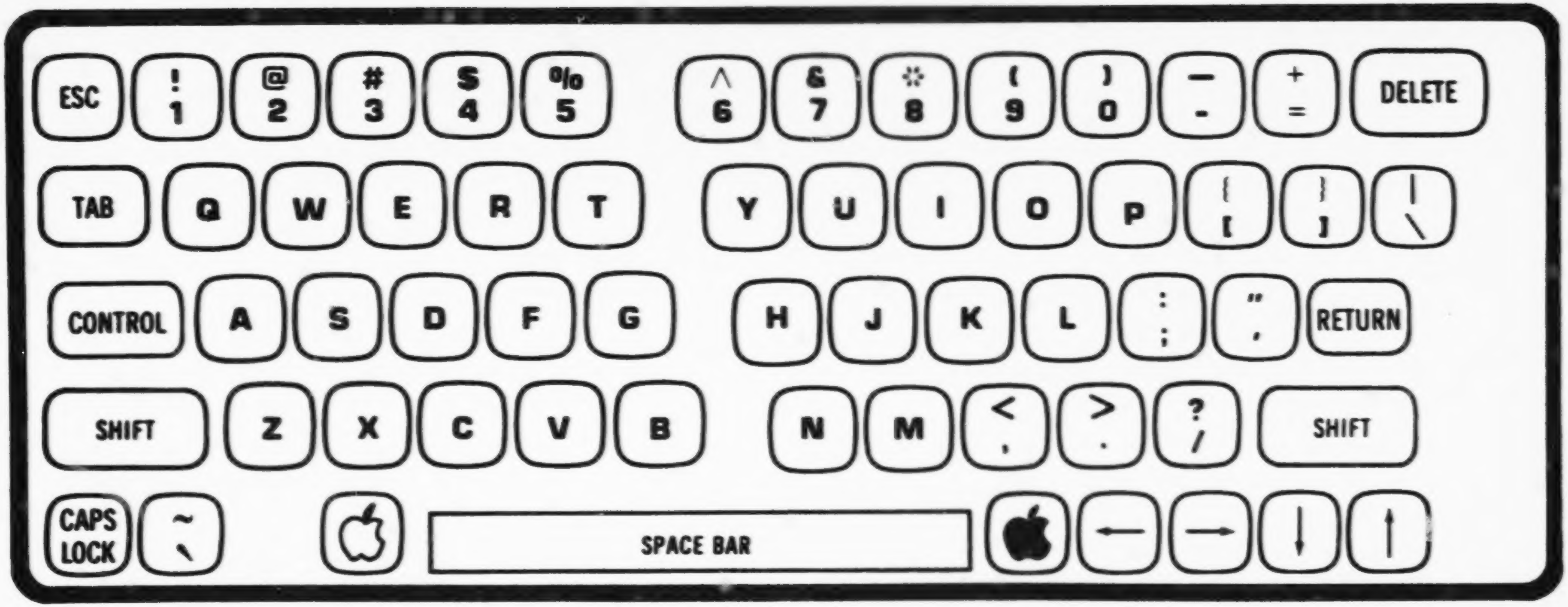
APPLE IIE
KEYBOARD


ESC
! 1
@ 2
# 3
$ 4
% 5
^ 6
& 7
* 8
(9
) 0
— -
+ =
DELETE
TAB
Q
W
E
R
T
Y
U
I
O
P
{ [
}]
| \
CONTROL
A
S
D
F
G
H
J
K
L
: ;
" '
RETURN
SHIFT
Z
X
C
V
B
N
M
< ,
> .
? /
SHIFT
CAPS LOCK
~ `
SPACE BAR
←
→
↓
↑

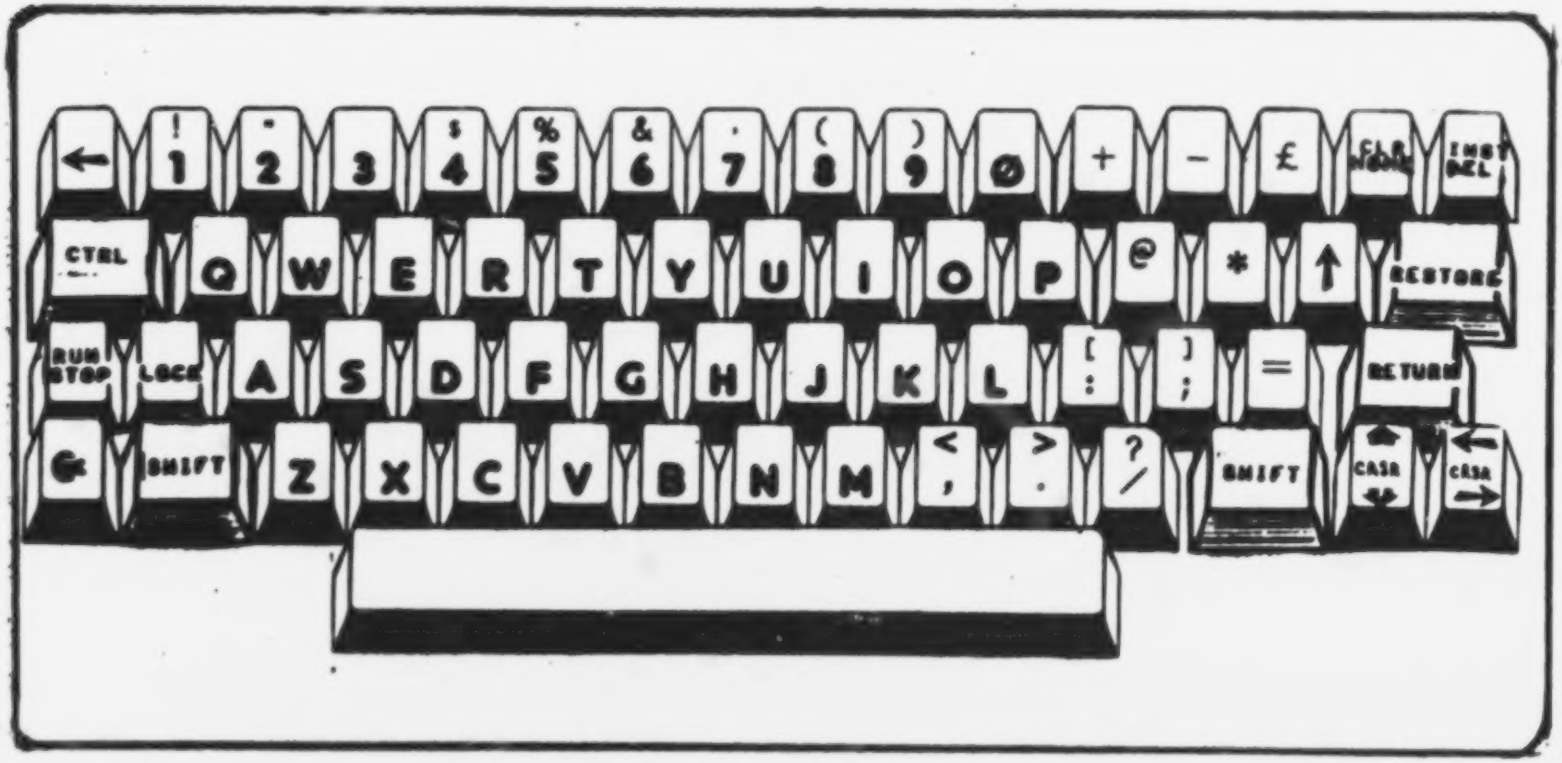
APPLE II PLUS KEYBOARD


! 1
" 2
# 3
$ 4
% 5
& 6
' 7
(8
) 9
0
* :
= –
RESET
ESC
Q
W
E
R
T
Y
U
I
O
@ P
REPT
RETURN
CTRL
A
S
D
F
BELL G
H
J
K
L
+ ;
←
→
SHIFT
Z
X
C
V
B
^ N
M
< ,
> .
? /
SHIFT
SPACE BAR

APPLE IIC
KEYBOARD

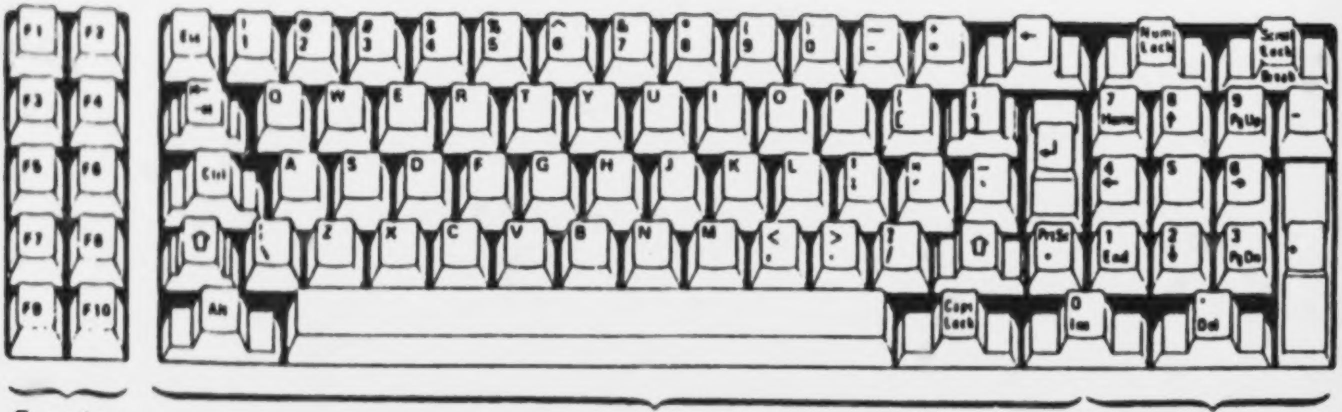

ESC
!
1
@
2
#
3
$
4
%
5
^
6
&
7
*
8
(
9
)
0
—
-
+
=
DELETE
TAB
Q
W
E
R
T
Y
U
I
O
P
{
[
}
]
|
\
CONTROL
A
S
D
F
G
H
J
K
L
:
;
"
'
RETURN
SHIFT
Z
X
C
V
B
N
M
<
,
>
.
?
/
SHIFT
CAPS LOCK
~
`
SPACE BAR
←
→
↓
↑

COMMODORE 64
KEYBOARD

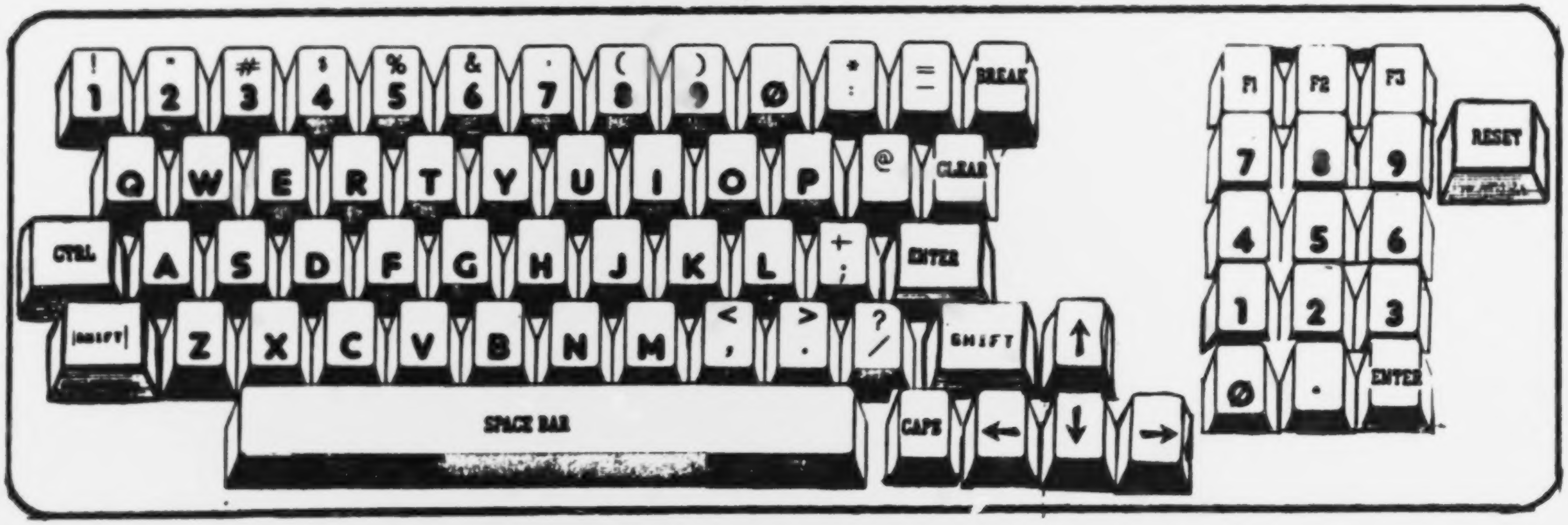

← ! 1 " 2 3 $ 4 % 5 & 6 ' 7 (8) 9 0 + − £ CLR HOME INST DEL
CTRL Q W E R T Y U I O P @ * ↑ RESTORE
RUN STOP LOCK A S D F G H J K L [:] ; = RETURN
SHIFT Z X C V B N M < , > . ? / SHIFT CRSR CRSR

I.B.M. /PC KEYBOARD

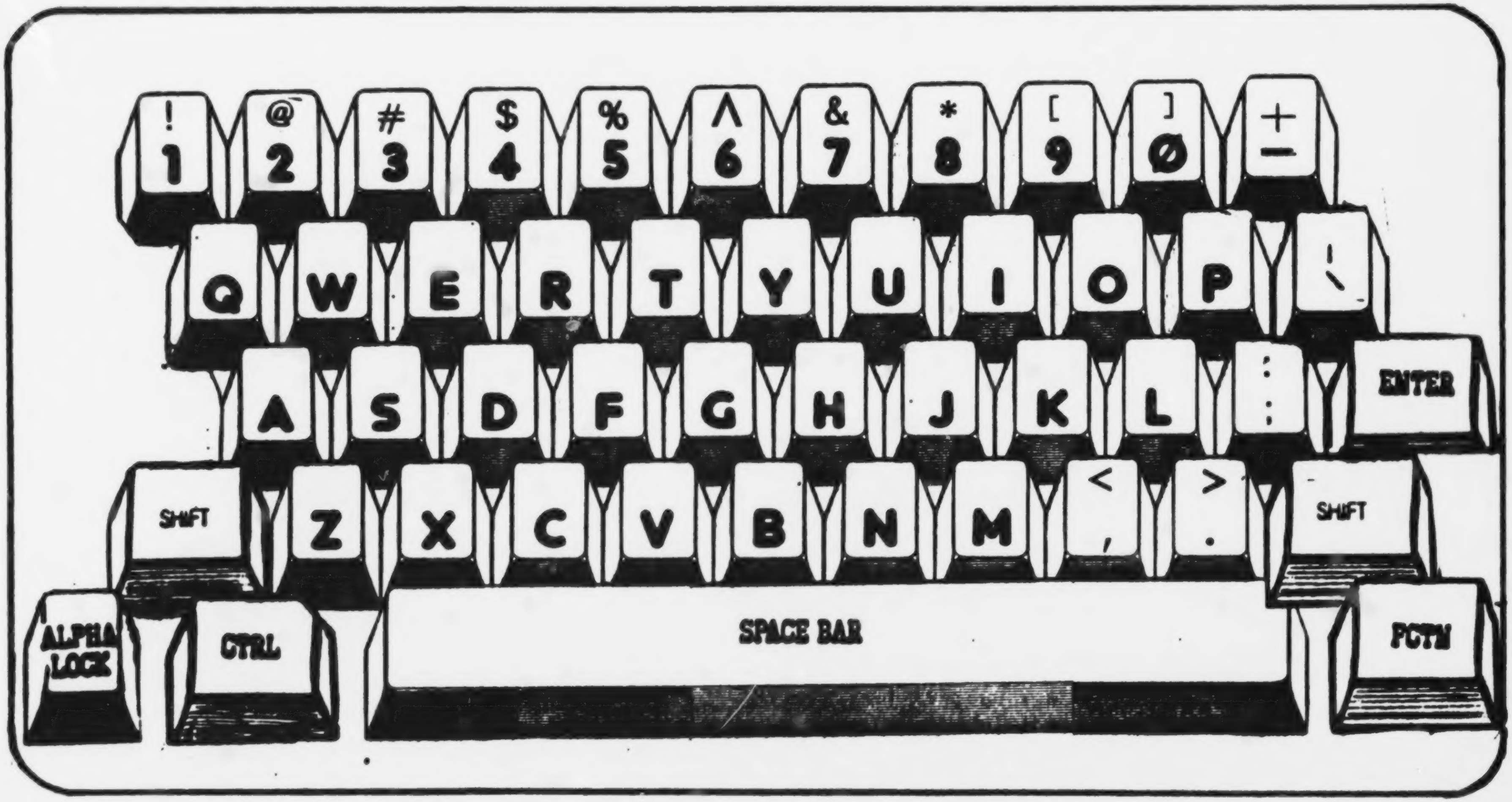
◆


F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
Function keys
Typewriter keyboard
Numeric keypad

KEYBOARD
TRS 80-MODEL IV


! 1
" 2
# 3
$ 4
% 5
& 6
' 7
(8
) 9
0
* :
= -
BREAK
Q
W
E
R
T
Y
U
I
O
P
@
CLEAR
CTRL
A
S
D
F
G
H
J
K
L
+ ;
ENTER
SHIFT
Z
X
C
V
B
N
M
< ,
> .
? /
SHIFT
↑
SPACE BAR
CAPS
←
↓
→
F1
F2
F3
RESET
7
8
9
4
5
6
1
2
3
0
.
ENTER

TI-99/4A KEYBOARD


! 1
@ 2
# 3
$ 4
% 5
^ 6
& 7
* 8
[9
] 0
+ −
Q W E R T Y U I O P
' `
A S D F G H J K L
: ;
ENTER
SHIFT
Z X C V B N M
< ,
> .
SHIFT
ALPHA LOCK
CTRL
SPACE BAR
FCTN

USING THE KEYBOARD

1. Type your name on the screen. Press the space bar to put a space between your first name and last name. Watch the cursor move as you type.

2. Now erase your name. (Depending on your computer, you will move the cursor back by pressing either the left facing arrow (←) or the delete key.)

3. Find these characters on the keyboard and type them. (Remember to use the shift key.)

   A 2 O 0 1 ;

4. Press the Enter (or RETURN) key. This tells the computer to enter what you just typed into its memory (RAM). But because you did not give it an instruction in the BASIC language (see BASIC chapter), it will display on the screen Syntax Error. This means the computer did not understand you.

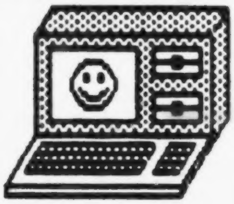
5. Now clear the screen. (Dending on your computer, you can press the CLEAR key, or type HOME.)

TEA's
ESSENTIAL ELEMENT

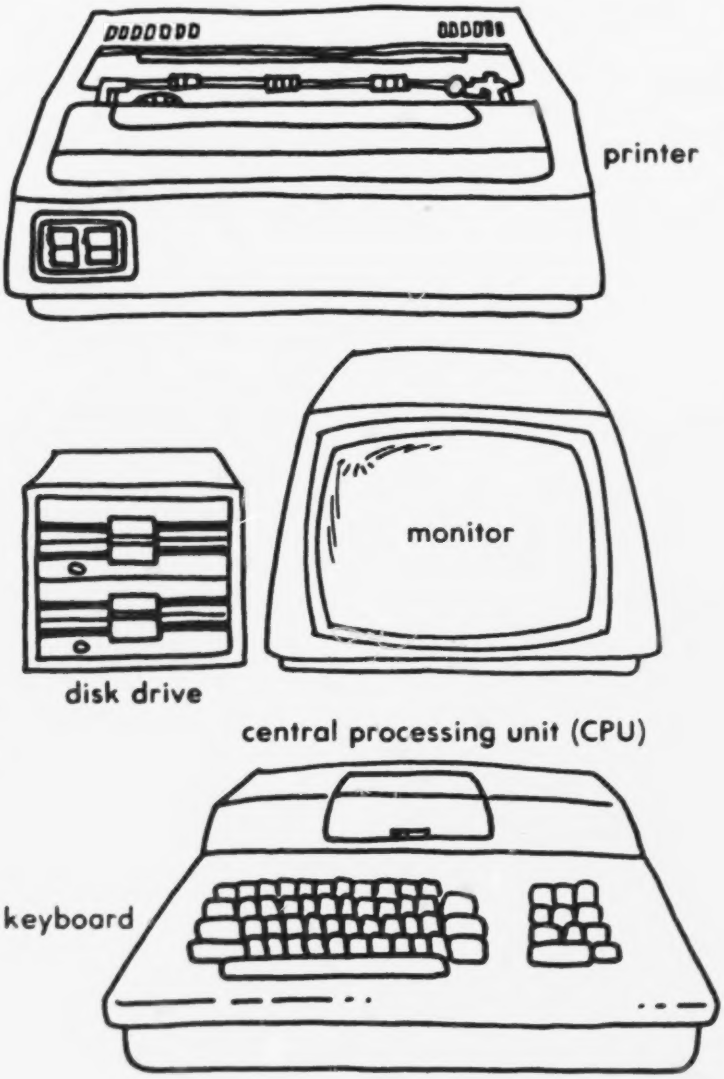
USE OF THE COMPUTER AS A TOOL

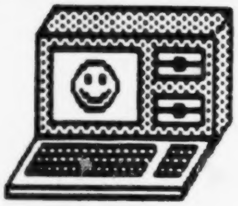
A. Perform basic computer operating procedures.

1. Demonstrate how to insert a disk, turn on the computer, and boot a program.
2. Demonstrate the ability to stop, escape from, and continue a program when needed and possible.
3. Run a program from a catalog and/or menu.
4. Recognize simple error messages (Syntax error, break in, etc.).
5. Demonstrate the proper care of hardware, disk, etc.
6. Use appropriate peripheral devices for particular tasks (i.e., printer, graphics tablet, etc.).
7. Demonstrate the ability to transfer, add, and delete files.



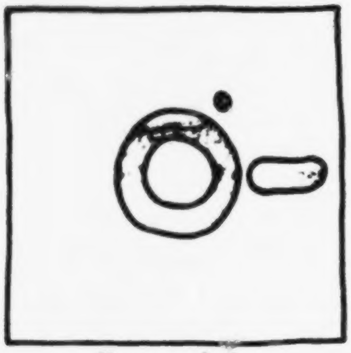
A Computer System Needs. . .
Hardware


printer
monitor
disk drive
central processing unit (CPU)
keyboard

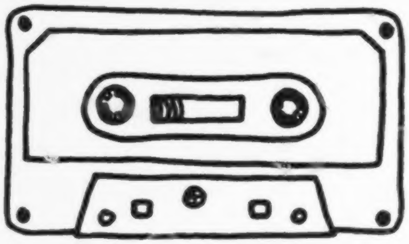


. . . and Software

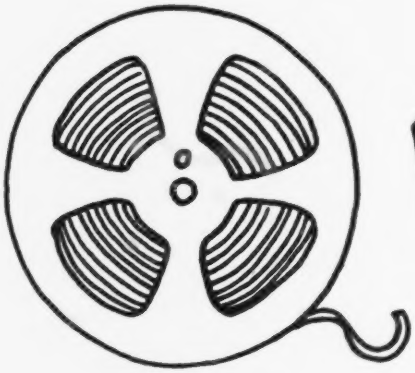
Software tells the computer what to do. Software programs are stored on:



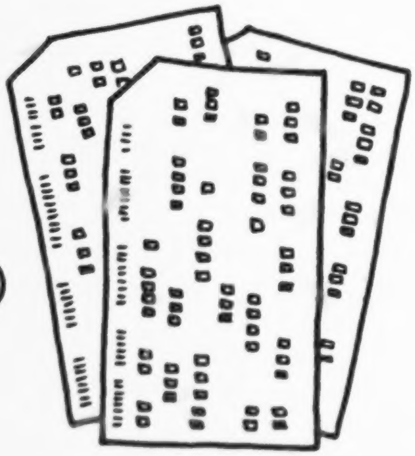
floppy disks



cassette tapes



reels of tape



punched cards

SOFTWARE

Every computer needs two kinds of programs in order to do its work.

1. SYSTEM SOFTWARE - System software consists of programs that control and direct the operation of the computer system, such as:

- A program that translates the programming language BASIC into machine language.
- A program that makes sure that when you press a letter on the keyboard a letter appears on the monitor.
- The disk operating system (DOS).

> The disk operating system usually comes on a special disk called the system disk or system master. DOS directs and manages the operation of the different parts of the computer system (monitor, disk drives and printer). It also contains other programs (called utility programs) that manage other basic operating functions such as formatting (initalizing a disk, backing up a copy, or removing a program from a disk.)

2. APPLICATION SOFTWARE - Application software consists of programs that have been written to solve particular problems or perform specific tasks. Application software can be general (like word processing because you use the program for many different things) or specific (such as teaching you how to play the guitar).

Once an application or system software program is written they are stored in some way outside the computer usually on a tape or more common a disk.

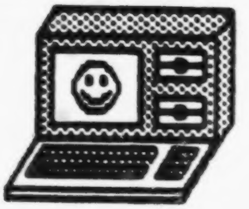
Most micro/minicomputers use floppy disks. These disks are usually 5¼ inches across or 3½ inches across. The "disk" you see is actually a square protective covering around a thin round disk. This covering keeps the disk from getting dirty or scratched.

Parts of the Floppy Disk:

- Drive Spindle Hole - Where the computer's disk drive attaches to the floppy disk.
- Head Access Opening - The "head" of the disk drive touches the floppy disk through this opening and reads the information on the disk (or writes information onto the disk).
- Write/Protect Notch - When this notch is open you can store information on the disk. If it is closed or covered with a special tape, you cannot store any information on the disk.

The surface of the Floppy Disk:

- The floppy disk is divided into circular tracks during formatting or initializing. (During formatting, the computer also checks for defects on the disk. Remember that each type of computer formats a disk differently -- and the number of tracks also differ.)
- Each track is divided into sectors; with each sector of a track holding a certain amount of information or bytes.



COMPUTER SOFTWARE

A LOOK AT A FLOPPY DISK

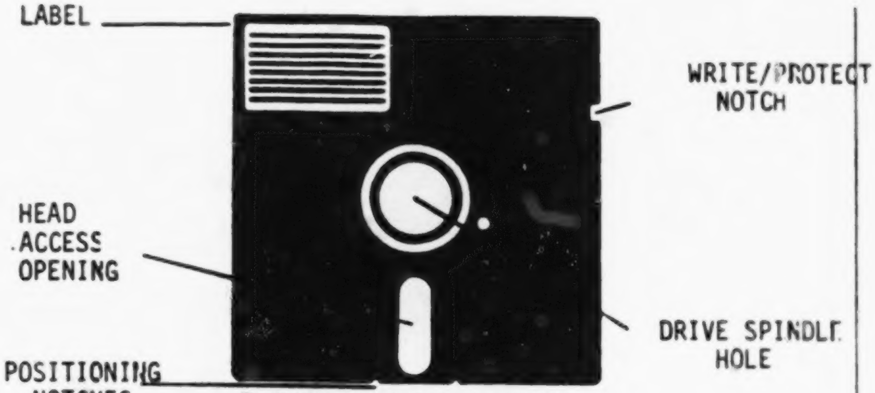

LABEL
WRITE/PROTECT NOTCH
HEAD ACCESS OPENING
DRIVE SPINDLE HOLE
POSITIONING NOTCHES

Fig. 1: A floppy disk looks like a paper-thin 45 RPM record, encased in a square protective cover

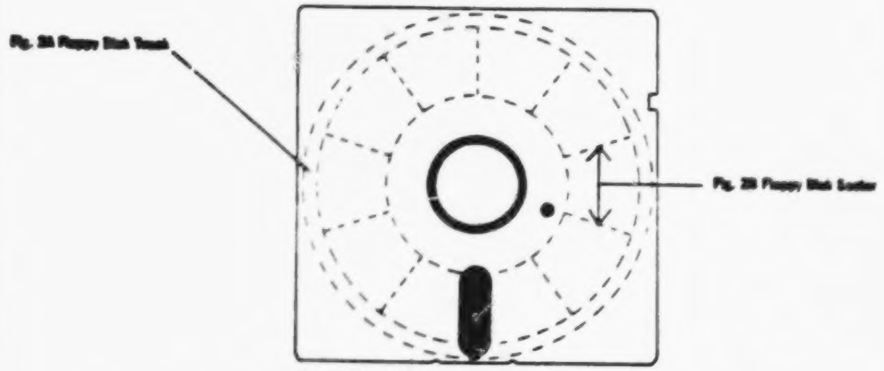


Fig. 2A Floppy Disk Track
Fig. 2B Floppy Disk Sector

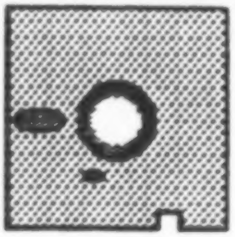
Fig. 2: *"Inside" a floppy disk*

Inside the protective covering of a floppy disk (*Fig. 2*) is a thin, round piece of plastic that stores data magnetically —in much the same way that cassette tapes store music. This piece of plastic is divided into circular tracks which are further divided into sections or sectors, neither of which you can actually see (*Fig. 2A and B*).

A typical "double density" floppy disk consists of 40 tracks and 10 sectors. Each sector of the double density disk can store 512 bytes of information, for a total of 5,120 bytes per track, and 204,800 bytes per disk. (A byte is a single unit of information, usually a letter, number or symbol.) That's the equivalent of about 60 single-spaced typewritten pages.

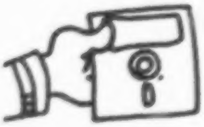
BEST COPY AVAILABLE

BEST COPY AVAILABLE

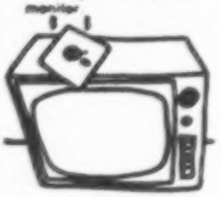


How to Take Care of a Floppy Disk

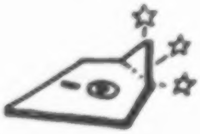
Floppy disks need tender loving care.



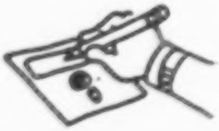
Always hold the disk by its label



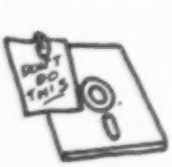
Don't lay the disk on the monitor



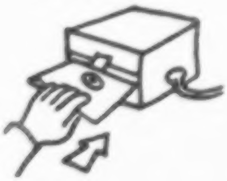
Don't bend or fold the disk



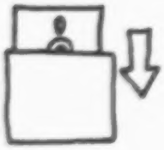
Always use felt pens to write on the disk label



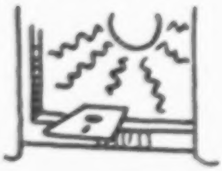
Never use paper clips or rubber bands around the disk



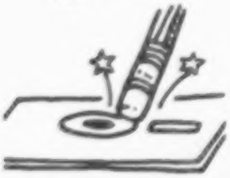
Always insert the disk carefully



Always keep the disk in its paper envelope when not in use



Keep the disk away from heat or direct sunlight

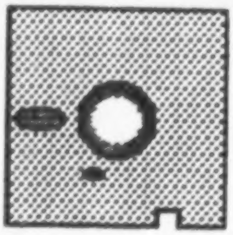


Never use erasers on the disk

Disk drives need care too!

Never, never, never put in or pull out a disk when the red light is on!

BEST COPY AVAILABLE



LOADING PROGRAMS INTO THE COMPUTER

Inserting floppy disks into the computer differ with computers. In some computers, you turn on the computer, then insert the disk into the disk drive. In other computers, you insert the disk and then turn on the computer.

"Loading" programs into the computer also differ from computer to computer. In some computers, you need to load the system disk or system master first and then after taking the system master out, you insert the program disk. You need to read the instructions for your computer and software program your using.

While your loading a software program from a floppy disk into your computer, you'll probably hear a humming or wherring sound, and the computers red light will be on. Remember not to take the disk out of the disk drive while the red light is on (or you'll erase all the information on the disk).

When a program has been loaded it means the information from the disk has been copied into Random Access Memory. The information stays in RAM until the computer is turned off.

After a program is loaded, you usually will see on the screen the title of the program, a table of contents and instructions on how to choose different parts of the program. The "menu" lets you see a list and choose different options of the program. The "directory" or "catalog" lists everything that is on the disk and different file names.

HOW TO LOAD SOFTWARE

● **APPLE II Plus,IIe, AND IIc**

Step 1 Turn on the monitor *(The knob is located on the front of the monitor on the right side)*

Step 2 Open the door on the disk drive

Step 3 Slide in the diskette, making sure the label faces up and goes in last You will hear a click when it is in place

Step 4 Close the door on the disk drive

Step 5 Turn on the microcomputer *(The switch is on the back of the keyboard on the left side)* You will hear a beep The disk drive will hum and the red "in Use" light will come on temporarily **Caution** *Do not insert or remove a disk while the drive is humming or while the red "In Use" light is on*

Step 6 Commercially prepared software may "boot" automatically If it doesn't, wait for the monitor prompt and type RUN and the name of the program For example RUN STARFIND

● **ATARI 400 or 800**

For cartridges

Step 1 Load BASIC

Step 2 Pull the lever on the cartridge cage door on top of the computer that is marked "Pull Open"

Step 3 After checking cartridge label to make sure you are inserting the right side up push the cartridge firmly into the slot until it clicks

Step 4 Close the cage door

Step 5 Turn on the monitor

Step 6 Turn on the monitor Step 7 Turn on the computer *(The switch is on the right side of the keyboard)* Step 8 Press START, then SYSTEM RESET Step 9 Press SELECT to display options

Step 10 Press OPTION to enter options selected

Step 11 Press START

Step 1 Make sure the computer is turned OFF

Step 2 Insert the BASIC cartridge into the cage at the top of the computer and close the cage door Step 3 Turn on the monitor, then the disk drive Step 4 Turn on the disk drive and wait for the humming to stop and the light to go out

Step 5 Carefully slide the diskette onto the drive, making sure that the label is on top and goes in last Close the diskette cage door

Step 6. Turn on the computer and wait for the diskette to load When the light goes out and the drive stops humming, the disk drives stops humming, the diskette will be loaded Step 7. Follow the instructions on the monitor screen.

● **COMMODORE PET**

For tapes

Step 1. Turn on the microcomputer. *(The switch is on the back of the keyboard on the left side)*

Step 2 Place the cassette in the player and rewind the tape.

Step 3 Type LOAD and press the RETURN key

Step 4 The computer will instruct you to press the PLAY key on TAPE 1

Step 5 The monitor will display the following sequence

SEARCHING
FOUND
LOADING
READY

The cursor will then flash

Step 6 Type RUN and press the RETURN key

Follow instructions on the monitor screen

For diskettes

Step 1 Turn on the microcomputer and the dual disk drive *(The switches are located on the back of the machine on the right side)*

Step 2 Open the door on the disk drive, and gently slide the disk into place The label should face up, toward you

Step 3 Close the door

Step 4 Type LOAD $,8 and press the return key (Programs vary greatly If this command fails to work, look for an accompanying manual)

Step 5 Type LIST and press the RETURN key to see a listing of all programs stored on the disk

Step 6 Type LIST and press the return key to see all the programs on the diskette

Step 7 Type LOAD "PROGRAM NAME",8 and press RETURN

Step 8 The program will load Type RUN and RETURN

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● COMMODORE 64

For cartridges

Step 1. Make sure your microcomputer is OFF.
Step 2: Turn on monitor or TV.
Step 3. Insert cartridge.
Step 4. Turn on microcomputer.
Step 5. Type START

Caution: Do not move cartridges in or out of the computer while it is on. To do so will damage the program.

For cassettes

Step 1. Make sure cassette is rewound before you begin.
Step 2. Turn on the microcomputer and type LOAD
Step 3. The monitor will respond PRESS PLAY ON TAPE
Step 4. Press Play on your cassette machine.
Step 5: The monitor will go blank for a minute until it finds the program. Then it will read FOUND PROGRAM (by name)
Step 6. Press the Commodore key.

For diskettes

Step 1: Turn on the monitor, the disk drive and *always last* the microcomputer.
Step 2: Open the door on disk drive and gently slide the disk into place. The label should be on top, facing you.
Step 3. Close the lever over the inserted disk.
Step 4. Type LOAD "PROGRAM NAME",8 press RETURN.
Step 5. Wait for the program to stop humming and the word READY to appear on your screen.
Step 6. Type RUN.

● IBM PC and PC Jr.

For diskettes

Read instructions carefully. Some software comes with specific instructions which you must follow specifically. Other software is formatted to load in the following way.

Step 1. Slide disk with the label facing up, toward you. Close drive.
Step 2. Turn on the computer. The program will "boot" automatically.

IBM PC Jr

For cartridges

Step 1. Turn on the monitor, then the microcomputer.
Step 2. Push cartridge firmly into one of the two cartridge slots.
Step 3. Program will "boot" automatically.

● Texas Instrument 99/4A

For modules

Step 1: Turn on the monitor *(the knob on the front, right,)* then the microcomputer *(the sliding switch on the front, right)*
Step 2. An introduction screen will appear on the monitor.
Step 3. Push the module firmly into the slot at the right of the keys.
Step 4. Press any key.
Step 5. Select the number of the program you wish to run and enter it on the keyboard. Follow the instructions that appear.

● TRS-80 COLOR COMPUTER

For Tapes

Step 1. Push the power button at the back of the computer to turn it on. *(It is located at the left of the wires.)*
Step 2. The monitor screen will light up. Press the ENTER key until it responds with READY.
Step 3. Connect the cassette player to the microcomputer.
Step 4. Turn on the cassette player and rewind the tape.
Step 5: Type CLOAD and press the ENTER key.
Step 6. Press PLAY on the recorder.
Step 7. The monitor will display the following sequence: "$" PROGRAM NAME OK
The cursor will the flash.
Step 8. Type RUN and press the ENTER key.

● TRS-80 COLOR COMPUTER and LEVEL III

For diskettes

Step 1. Turn on the microcomputer. *(The switch is under the keyboard on the right edge.)*
Step 2. Open the cage door of the disk drive.
Step 3. Slide the diskette into the slot with the label on top toward you.
Step 4. Close the cage door.
Step 5. Press the square orange RESET button on the right of the keyboard.
Step 6. As the microcomputer loads the program, the disk will hum and the light will come on. Then a catalog will appear on the screen.
Step 7. Type LOAD "PROGRAM NAME"

8 QUESTIONS TO ASK THE SALESPERSON BEFORE YOU BUY

1 What equipment is included in the total price of the computer?
Determine whether the cost includes only the terminal (the keyboard with the computer's memory inside) or the terminal, monitor (the screen) and disk drive in one unit.

2 If the price doesn't include the disk drive, how much more will that cost me?
A disk drive can cost more than the computer. You can get started with a cheaper tape cassette, but you may soon find it too slow and limited. Disks are far more efficient and costly. A computer that comes with a dual disk drive may be cheaper than a terminal for which you must buy a separate dual disk drive.

3 If the cost of a monitor is not included, can I use the computer easily with a regular television screen?
Many computers can be hooked up to your TV screen. But, check the price and quality of a monitor; you may want to buy this equipment later.

4 What is the personal computer's memory capability?
Today's home computers should have at least 64K memory. These models can be purchased for $300–$500.

5 How much do the compatible printers cost?
You will doubtless want a printer eventually; without one, you have no record of your work on paper. Ask to see a demonstration, and check the quality and cost of both a letter-quality printer (like typewritten letters) and a dot-matrix printer (computer letters formed from dots). If you only want to print out programs, an inexpensive dot-matrix printer may be adequate. However, if you plan to send out letters, you probably will want a letter-quality printer. Also check the manual that comes with the printer to find out how easy it is to change the ribbon. Look into whether you can change the type of print by a daisy wheel or some other device, and ask what width of paper to use.

6 What is the computer's word processing like?
Try the keyboard for size and personal preference. Check the prices of different word processing packages; quality varies. Find out whether it has an 80-character count per line (the spaces across the computer). If it doesn't, be sure you can at least print in 80 characters. It's not difficult to adjust a 40-character screen to print in an 80-character width. The word processing program should allow you as much screen space as possible for working, with no more than two lines taken up by program guides.

7 What kinds of software are available for this computer?
The computer programs are just as important as the computer itself. When trying out a computer, find out what software is being demonstrated on the machine. You may like the software more than the computer. Try a couple of computers using the same software to determine subtle differences in the machines. If you have children, you will want to be able to buy suitable software to run on the computer. Compare prices of games and software you need. Then make your decision based on both the machine and its software capabilities.

8 Does your store offer any help with installment or the setting up of the computer?
Ask to see computer manuals that explain installation and use—and decide whether you can follow the directions. If not, find out whether the salesperson will be available.

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WORDS TO KNOW

Application Software -	Computer programs that perform certain tasks.
Cursor -	A small patch of light on the computer screen that shows where your next entry will appear.
Directory -	A "table of contents" or list of everything stored on a disk.
Disk -	A flat, circular device with a magnetic surface that is capable of storing computer programs. Some disks are flexible (floppy) and some are hard.
Disk Operating System (DOS) -	A special program that tells the computer how to interact with the disk drive and other units.
Drive Spindle Hole -	The centered opening where a disk attaches to the disk drive.
Initialize -	To make a computer disk ready for storing data; to format a disk.
Keyboard -	A unit like a typewriter used for putting information into a computer.
Load -	To copy a program or file from a disk or tape into the computer's memory.
Menu -	A list of the parts of a program; the tasks a particular program can do.
Software -	Programs, or instructions, that tell the computer what to do.
System Disk -	The disk containing the computer's disk operating system (DOS).
Write/Protect Notch -	A small groove on the edge of a disk that you cover with special tape when you want to prevent the dirve from storing data on the disk.

These questions will be on your posttest. Can you answer them now?

1. A cursor is:
   a. A blinking light on the screen.
   b. Someone who swears a lot.
   c. An indicator light that tells you if the power is on
   d. A person who keeps forgetting to press return

2. To put a program into a computer, you must type:
   a. PUT
   b. LOAD
   c. RUN
   d. PRINT

3. To get the microcomputer to do a program, you must type:
   a. PRINT
   b. EXECUTE
   c. COMPUTE
   d. RUN

4. To type the upper character of a key, you must first press:
   a. ESC
   b. SHIFT
   c. DELETE
   d. RETURN

5. Computer programs are called:
   a. Microprocessors
   b. Hardware
   c. Indata
   d. Software

6. When you finish typing a line, you must press the:
   a. Control key
   b. Shift key
   c. Delete key
   c. Return key

7. To list program on a disk, you type:
   a. RUN
   b. CATALOG
   c. LIST
   d. SEARCH

COMPUTER WORDS

TEA's

ESSENTIAL ELEMENT

COMPUTER RELATED TERMINOLOGY AND USE

Identify Computer Terminology

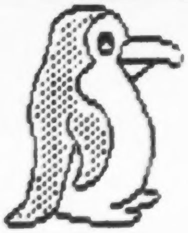
1. Identify Terms related to computer programming and languages, i.e., BASIC, Pascal, Logo, Fortran, debug, cursor, algorithm, top down design, iterate, array, program, graphics, computer science, etc.

2. Identify Terms related to computer hardware and peripherals, i.e., input, output, keyboard, monitor, CRT, disk drive, diskette, peripheral, printer, modem, chip, integrated circuit, LSI, VLSI, RAM, ROM, etc.

3. Identify Terms related to computer applications and operating system, i.e., simulation, modeling, word processing, data processing, software, disk operating system (DOS), backup, computer aided design, computer managed instruction, etc.

4. Identify Terms designating the various categories of computers, i.e., mainframe, minicomputer, microcomputer, lap, portable, artificial intelligence, generation of computers.

5. Identify Terms relating to computer measurement, and data transmitted i.e., bit, byte, kelobyte, digit, data, memory, text, machine code, nanosecond, telecommunication, networking, etc.



COMPUTER TERMINOLOGY - JARGON

"My mom heard me say that my computer program needs debugging."

Every area of specialization has its own vocabulary called jargon. Computer-related phrases often appear to be very strange. Many computer words are acronyms. An acronym is a new word that is formed by combining letters from words in a phrase. People use acronyms when it is easier to group parts of several words together into one new word than to say all of the words together. Acronyms are used so often in computing that the original phase is frequently forgotten and the new word becomes a symbol for a thing, an idea, or a process.

Acronyms

BASIC	-	Beginners All-purpose Symbolic Instruction Code
CPU	-	Central Processing Unit
I/O Devices	-	Input/Output Devices
GIGO	-	Garbage In, Garbage Out
UPC	-	Universal Product Code
RAM	-	Random Access Memory
ROM	-	Read Only Memory
DOS	-	Disk Operating System

There are also non-technical words we use in everyday life that are also used to describe computer functions.

Run	-	The computer is solving problems and it completes a "run."
Up	-	If a computer system is up, its operational.
Down	-	If a computer system is down, its not working.
Bugs	-	The program isn't working if there are bugs or errors in the program.

DID YOU KNOW??

THE ORIGIN OF "THE BUG"

(Somewhere Around 1944)

Mark I was the first electromechanical computer. Many of its components were relays that moved to open and close electrical circuits. The story goes that one day the system stopped operating efficiently. The technicians looked around and found a moth caught in a relay. They removed the moth, recorded the incident in their log, and jokingly said, that they were "debugging" the system. The tradition continues today; a bug usually means an error in human logic. The moth may be seen taped to the log's record of the event at the U. S. Naval Bureau in Washington, D. C.

These are computer words you should know. Definitions are at the end of each chapter.

Ⓐ Abacus
Acronym
Ada
Algorithm
Alphanumeric
Analog Computer
Animation
Application Program
Arithmetic and Logic Unit
Arithmetic Operator
Array
Artificial Intelligence
ASCII
Assembly Language
Authoring Language
Auxiliary Storage

Ⓑ Babbage, Charles
Backspace
Bar Code
BASIC
Beginner's All-purpose Symbolic Instruction Code
Binary System
Bit
Boot
Branch
BREAK
Bug
Byte

Ⓒ Calculator
Cartridge
Cassette
CATALOG
Cathode-ray Tube
Central Processing Unit
Character
Chip
Circuit
Clear
COBOL
Command
Compatible
Computer
Computer-aided Instruction
Computer Jargon
Computer Literacy
Control Unit
Copy
Cursor

Ⓓ Data
Data Bank
Data Base
Data Processing
DELETE
Digital Computer
Disk
Disk Drive
Disk Operating System

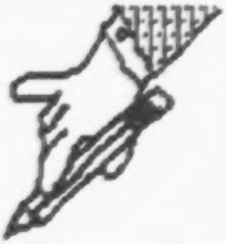
Documentation
Ⓔ Edit
END
ENIAC
Enter
Ⓕ Feed
Flowchart
Format
Ⓖ GIGO
Graphics
Ⓗ Hard Copy
Hardware
Hollerith, Herman
Ⓘ Information Retrieval
Initialize
Input
Instruction
Integer
Intelligent Computer
Interactive
Ⓙ Joy Stick
Ⓚ Keyboard
Keypunch
Kilobyte
Ⓛ Large-scale Integration
Light Pen
Line Number
Load
LOGO
Loop

Ⓜ Mainframe
Memory
Menu
Microcomputer
Minicomputer
Modem
Monitor
Ⓝ Nanosecond
Network
NEW
Ⓞ On-line
Operating System
Operator
Optical Mark Recognition
Output
Ⓟ Pascal, Blaise
Password
Peripherals
Personal Code
PRINT
Printed Circuit Board
Printer
Program
Programmer
Prompt
Ⓡ Random-access Memory
Read
Read-only Memory
RESET
RETURN
Robot

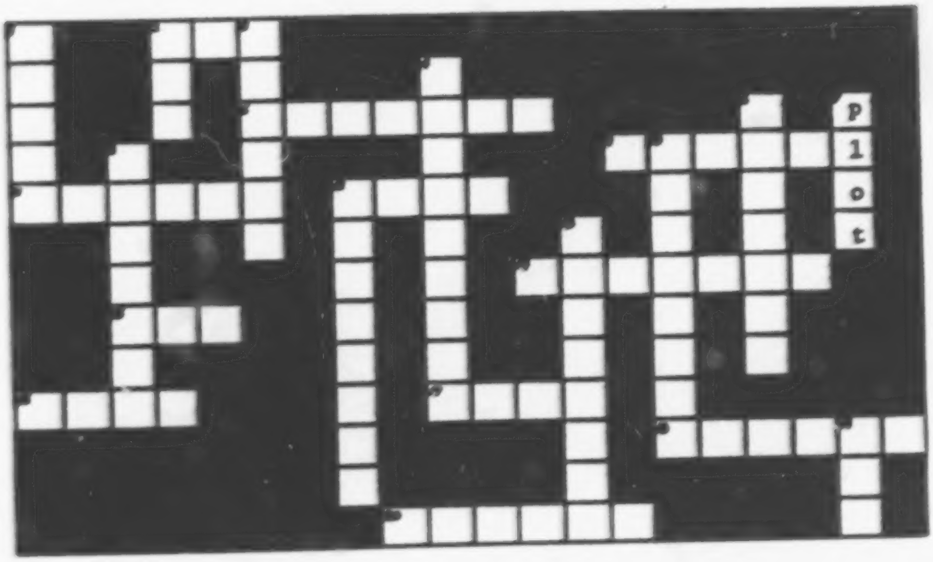
RUN
Ⓢ SAVE
Shift
Simulation
Software
Space Bar
Speech Synthesis
Statement
Storage
String Variable
SYNTAX ERROR
Synthesizer
Ⓣ Telecommunication
Terminal
Ⓤ User-friendly computer

Ⓥ Variable
Video
Voice Recognition

Ⓦ Word Processing
Write



DEFINITIONS CROSSWORD PUZZLE



ACROSS

2. Memory that always stays in computer.
5. The TV part of a computer.
9. This means to "roll up" the screen.
11. A blinking square that tells you where you are.
12. Command you give when you want to go to a certain statement.
14. The printed picture you see on the screen.
15. Command you use to tell the computer to make the program begin.
16. A statement to clear the screen.
17. You ________ on the keyboard to write your message.
18. Key you use to send what you typed into memory.
20. Part of the monitor that displays the picture.

DOWN

1. Our computer's language.
2. Memory you write in.
3. Place where computer keeps all information.
4. You type it into the computer and can number it.
6. You tell the computer to do something and give it a ________.
7. Command you give before telling where you want a certain color.
8. When we tell the computer what to do with statements, we are writing a ________.
10. Our electronic machine.
12. Something you draw on the screen.
13. Soft, floppy record that stores information.
19. Command you type to start a program.

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Answers

Across: 2)ROM 5)Monitor 9)Scroll 11)Cursor 12)GOTO 14)Display 15)Run 16)Home
17)Type 18)Return 20)Screen

Down: 1)BASIC 2)RAM 3)Memory 4)Statement 6)Command 7)Plot 8)Program 10)Computer
12)Graphics 13)Diskette 19)Run

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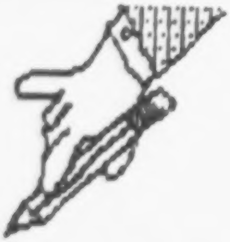
DID YOU KNOW??

THE TERM ROBOT

Robot comes from the Czech word "robota," which means "forced labor." It was first used in a play in 1920 in which robot slaves rose up in rebellion against their masters.

COMPUTER WORD SEARCH

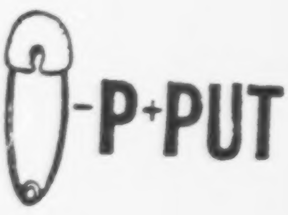


FIND THE FOLLOWING COMPUTER WORDS:

COMPUTER
KEYBOARD
MONITOR
SCREEN
DISPLAY
IBM
PROGRAMMING
RETYPE
COMMAND
HOME
ERROR
SCROLL
BACKSPACE
PLOT
TYPE
CURSOR
COMMODORE
STATEMENT
RETURN
BASIC
RUN
DISKETTE
CATALOG
SPACE BAR
COLOR
APPLE
SPEED
MEMORY

P	R	O	G	R	A	M	M	I	N	G	J	I	L	L	J	O	Y	C
C	O	S	T	A	T	E	M	E	N	T	Q	E	R	R	O	R	P	O
O	B	C	U	R	S	O	R	U	N	Q	R	E	T	U	R	N	S	M
M	O	R	T	V	G	L	O	C	K	A	X	H	O	M	E	Y	C	M
P	K	E	Y	B	O	A	R	D	I	S	K	E	T	T	E	A	R	O
U	G	E	P	H	T	S	C	R	E	E	N	S	C	L	Y	J	O	D
T	V	N	E	S	O	A	M	E	Z	C	I	P	O	B	J	E	L	O
E	T	G	H	M	O	N	I	T	O	R	E	E	L	A	V	F	L	R
R	O	A	P	P	L	E	O	Y	E	A	M	E	O	S	A	F	M	E
C	O	M	M	A	N	D	I	P	R	U	N	D	R	I	P	R	E	O
B	D	I	S	P	L	A	Y	E	R	S	T	A	T	C	L	E	M	I
Y	C	A	T	A	L	O	G	R	O	I	M	X	H	Z	O	Y	O	B
S	P	A	C	E	B	A	R	A	R	Y	I	R	A	V	T	S	R	M
T	X	O	B	A	C	K	S	P	A	C	E	I	N	E	W	X	Y	I

Computer Rebus



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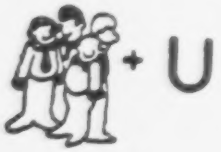

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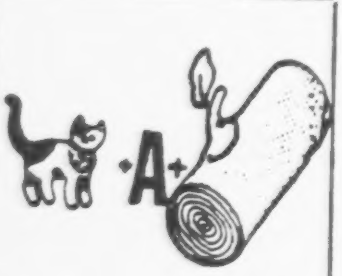

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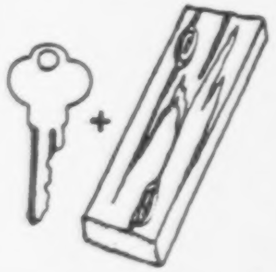

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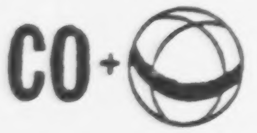

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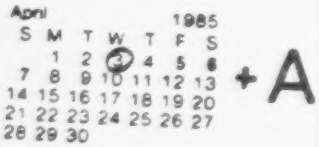
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7 8 9 10 11 12 13
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21 22 23 24 25 26 27
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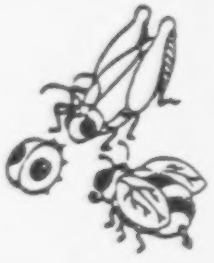

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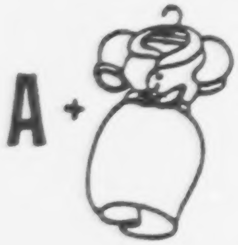

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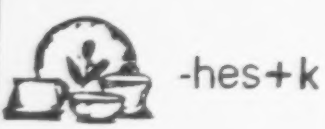

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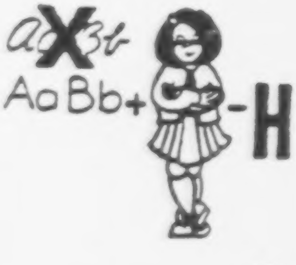

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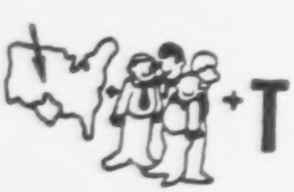

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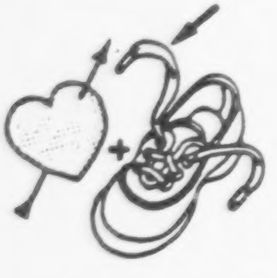


12

ANSWERS: 1. Input, 2. Menu, 3. Catalog, 4. Keyboard, 5. COBAL, 6. Data, 7. Bugs
8. Address, 9. Disk 10. Printer 11. Statement, 12. Lovelace

COMPUTER PRETEST/POSTTEST

PRETEST/POSTTEST

There are two pretests and two posttests included in this section. Level 1 tests are written at a 8th grade level with easier questions; Level 2 tests are written at a 10th grade reading level with somewhat harder questions.

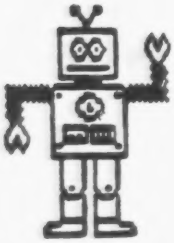
Each pre and posttest is made up of two parts. One part requires the student to match words and pictures, while the other is made up of multiple choice questions on computer awareness, computer operations, and basic programming. If a computer is available, the student should complete the "matching" portion of the test (written), then complete the multiple choice questions on the computer.

The computer tests are designed so that once the test program has been loaded into the computer, all the student needs to do is write in his/her name and follow directions. Once a student has finished the test and recorded his/her scores, another student can start just by pressing the space bar. If no one else is taking the test, the disk can be removed from the computer.

The pre/posttests have been developed for the Apple, Commodore, TRS-80, and IBM computers. Both the matching portion and multiple choice questions can be completed even if a computer is not available.

Please note that some of the test questions may differ on the computers because of their different functions. It is "enter" on one computer, but "return" on another. The specific questions have been asterisked in the manual.

Each student, or the teacher, should keep track of the pretest scores so they can be compared later to the student's posttest.



TEST RESULTS

STUDENT NAME: ______________________________

Indicate which test you have taken and fill in the number and percent of "RIGHT" questions. The number will appear on the computer screen after you have finished taking each test.

- Pretest - Level 1

Number right on "MATCHING" test: ______

Total Number of Questions:	20
Total Number Correct:	____
Percent Correct:	____

- Pretest - Level 2

Number right on "MATCHING" test: ______

Total Number of Questions:	20
Total Number Correct:	____
Percent Correct:	____

- Posttest - Level 1

Number right on "MATCHING" test: ______

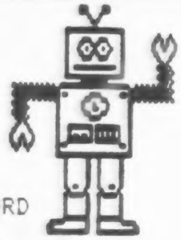
Area	# of Questions	Number Right	Percent Right
Computer Operations	7		
Computer Awareness	13		
Basic Programming	10		
TOTAL	30		

- Posttest - Level 2

Number right on "MATCHING" test: ______

Area	# of Questions	Number Right	Percent Right
Computer Operations	8		
Computer Awareness	17		
Basic Programming	15		
TOTAL	40		

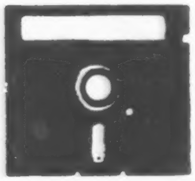
MATCHING



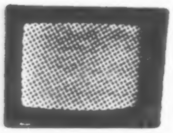
PRETEST
LEVELS 1,2

DIRECTIONS: DRAW A LINE FROM THE WORD
TO THE CORRECT PICTURE.

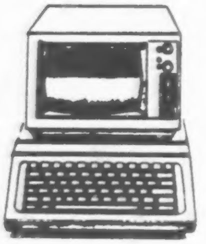
COMPUTER



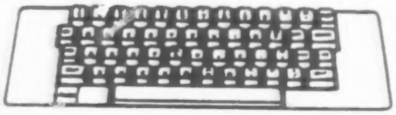
KEYBOARD



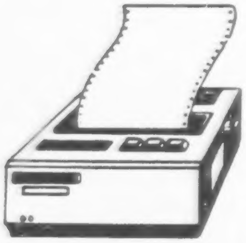
DISKETTE

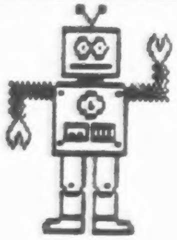


SCREEN



PRINTER





PRETEST - LEVEL 1

Circle the right answer (a, b, c, or d) for each of the questions below.

1. The father of computers was:
   - a. Pascal
   - b. Babbage
   - c. Hollerith
   - d. Jacquard
2. One of the first tools used to express numbers was the:
   - a. Computer
   - b. Calculator
   - c. Abacus
   - d. Tabulating machine
3. Police use computers to:
   - a. Keep track of everyone
   - b. Know the actions of crooks
   - c. Check who owns a car
   - d. None of the above
4. The increased use of computers:
   - a. Creates new jobs
   - b. Replaces thinking
   - c. Takes away jobs
   - d. Creates new jobs and takes away jobs
5. Copying commercial software programs:
   - a. Is illegal
   - b. Is OK if code can be broken
   - c. Is OK if you have permission
   - d. Is OK if teacher knows

6. Choose the true statement:
   a. Computers need instructions to work
   b. Computers have brains
   c. Computers are smarter than humans
   d. All of the above

7. What type of computer would an airline use to make reservations?
   a. Mainframe computer
   b. Minicomputer
   c. Microcomputer
   d. Digital computer

8. Computer programs are called:
   a. Microprocessors
   b. Hardware
   c. Indata
   d. Software

9. A computer printout is:
   a. Writing on a screen
   b. Printed results on paper
   c. Time when the computer is working
   d. Outdata

10. "Debugging" means:
   a. Fixing mistakes in a program
   b. Killing bugs inside the computer
   c. Turning off the computer
   d. Removing computer hardware

11. The screen that shows information is a:
   a. Keyboard
   b. Diskdrive
   c. Monitor
   d. Compiler

12. Information processed by a computer is called:
   a. Floppy disk
   b. Printout
   c. Hardware
   d. Data

13. A cursor is:
    a. A blinking light on the screen
    b. Someone who swears a lot
    c. An indicator light that tells you if the power is on
    d. A person who keeps forgetting to press return

14. When you finish typing a line, you must press the:
    a. Control key
    b. Shift key
    c. Delete key
    d. Return key

15. To put a program into a computer, you must type:
    a. "PUT"
    b. "LOAD"
    c. "RUN"
    d. "PRINT"

16. To store a program for future use, you must type:
    a. "SAVE"
    b. "LOAD"
    c. "KEEP"
    d. "NEW"

17. To get the microcomputer to do a program, you must type:
    a. "PRINT"
    b. "EXECUTE"
    c. "COMPUTE"
    d. "RUN"

18. To type the upper character of a key, you must first press:
    a. "ESC"
    b. "SHIFT"
    c. "DELETE"
    d. "RETURN"

19. Which of these is "ZERO" on the computer?
    a. 0
    b. Ø
    c. Both a and b
    d. Neither a nor b

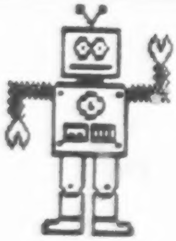
20. A computer program is:

    a. A computer chip in the back of the computer
    b. A peripheral output device
    c. A set of instructions for the computer
    d. Hardware

LEVEL 1

PRETEST SCORES

Total Number of Questions:	20
Total Number Correct:	___
Percent Correct	___



PRETEST - LEVEL 2

Circle the right answer (a, b, c, or d) for each of the questions below.

1. The father of computers was:
   - a. Pascal
   - b. Babbage
   - c. Hollerith
   - d. Jacquard
2. One of the first tools used to express numbers was the:
   - a. Computer
   - b. Calculator
   - c. Abacus
   - d. Tabulating machine
3. To calculate numbers, primitive people used:
   - a. Calculators
   - b. Adding machines
   - c. Pebbles and stones
   - d. Computers
4. A computer programmer:
   - a. Sets-up a computer system
   - b. Prepares instructions for a computer
   - c. Schedules jobs for a computer
   - d. Designs computers to do certain jobs
5. Choose the true statement:
   - a. Computers need instructions to work
   - b. Computers have brains
   - c. Computers are smarter than people
   - d. All of the above

6. Copying commercial software programs:
   a. Is illegal
   b. Is OK if code can be broken
   c. Is OK if you have permission
   d. Is OK if teacher knows

7. Which occupations use computers to store a lot of information?
   a. Police
   b. Librarians
   c. Bankers
   d. All of the above

8. Computer programs are called:
   a. Microprocessors
   b. Hardware
   c. Indata
   d. Software

9. A computer printout is:
   a. Writing on a screen
   b. Printed results on paper
   c. Time when the computer is working
   d. Outdata

10. "Debugging" means:
    a. Fixing mistakes in a program
    b. Killing bugs inside the computer
    c. Turning off the computer
    d. Removing computer hardware

11. A computer:
    a. Accepts information
    b. Stores information
    c. Processes information
    d. All of the above

12. A cursor is:
    a. A blinking light on the screen
    b. Someone who swears a lot
    c. An indicator light that tells you if the power is on
    d. A person who keeps forgetting to press return

13. When you finish typing a line, you must press the:
    a. Control key
    b. Shift key
    c. Delete key
    d. Return key

14. To put a program into a computer, you must type:
    a. "PUT"
    b. "LOAD"
    c. "RUN"
    d. "PRINT"

15. To store a program for future use, you must type:
    a. "SAVE"
    b. "LOAD"
    c. "KEEP"
    d. "NEW"

16. To get the microcomputer to do a program, you must type:
    a. "PRINT"
    b. "EXECUTE"
    c. "COMPUTE"
    d. "RUN"

17. To type the upper character of a key, you must first press:
    a. "ESC"
    b. "SHIFT"
    c. "DELETE"
    d. "RETURN"

18. The programming language most used for microcomputers is:
    a. BASIC
    b. COBOL
    c. PASCAL
    d. ADA

19. Pictures and graphs drawn by a computer are called:
    a. Programming
    b. Text display
    c. Computer graphics
    d. Photographing

20. The command to display the program on the screen is:

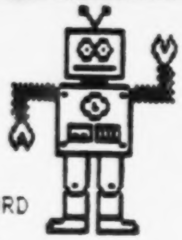
   a. "NEW"
   b. "GOTO"
   c. "LIST"
   d. "READ"

LEVEL 2

PRETEST SCORES	
Total Number of Questions:	20
Total Number Correct:	___
Percent Correct	___

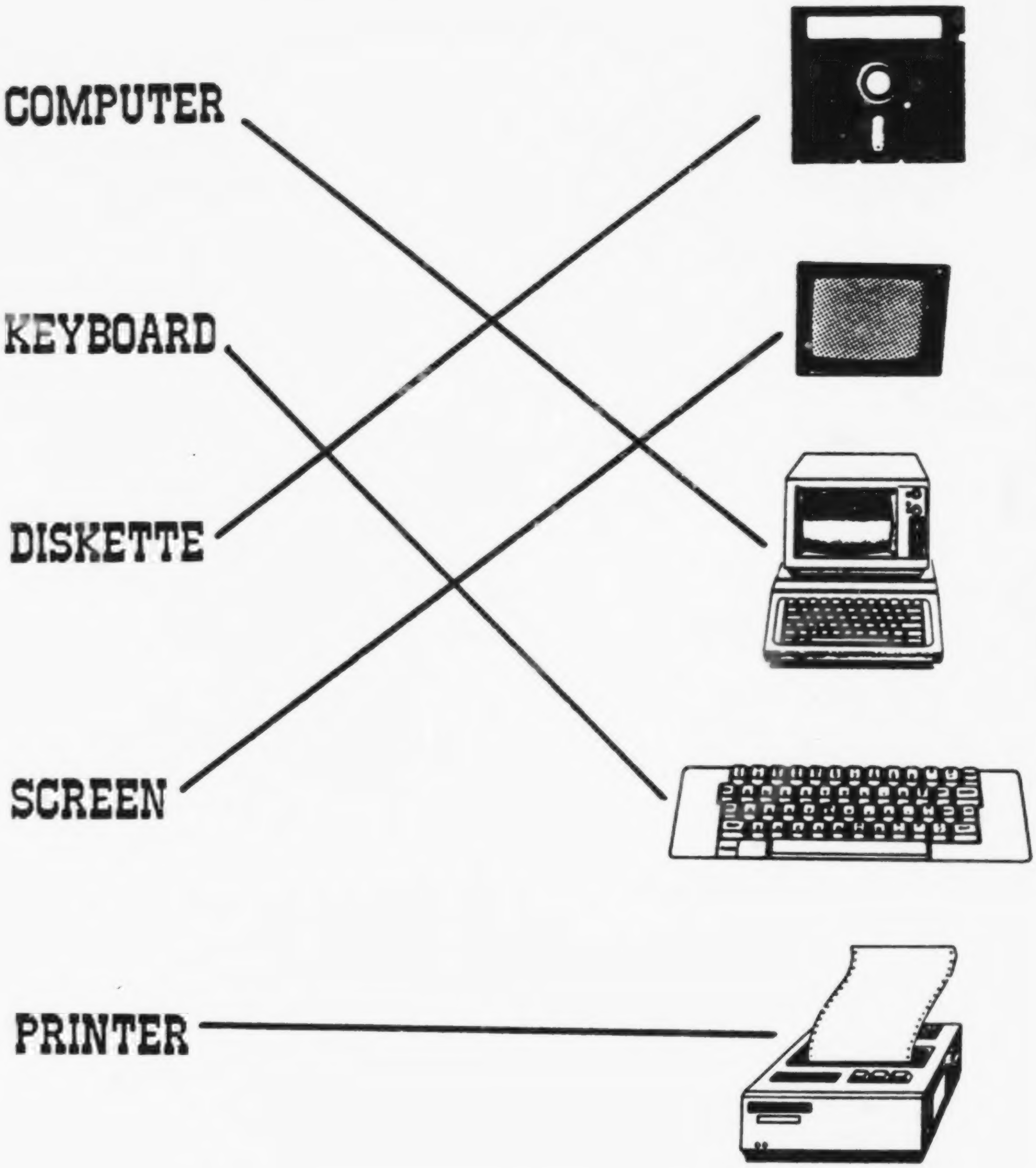
ANSWER SHEET

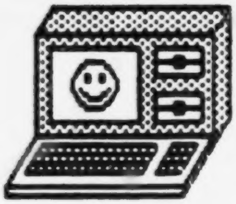
PRETEST
LEVELS 1,2



MATCHING

DIRECTIONS: DRAW A LINE FROM THE WORD
TO THE CORRECT PICTURE.


COMPUTER
KEYBOARD
DISKETTE
SCREEN
PRINTER

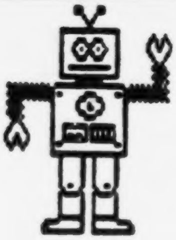


PRETEST ANSWERS

Multiple Choice	Level 1	Level 2
1.	b	b
2.	c	c
3.	c	c
4.	d	b
5.	c	a
6.	a	c
7.	a	d
8.	d	d
9.	b	b
10.	a	a
11.	c	d
12.	d	a
13.	a	d
14.	d *	b *
15.	b	a
16.	a	d
17.	d	b
18.	b	a
19.	b	c
20.	c	c

*or Enter

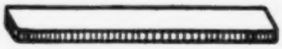
MATCHING



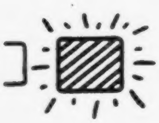
POSTTEST
LEVELS 1,2

DIRECTIONS: DRAW A LINE FROM THE WORD
TO THE CORRECT PICTURE.

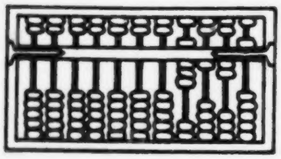
COMPUTER



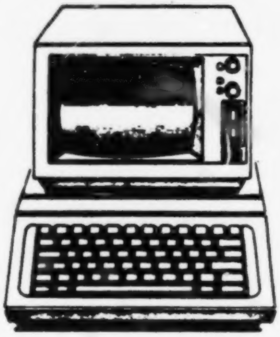
DISK



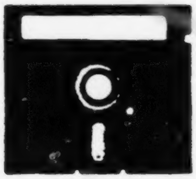
CURSOR



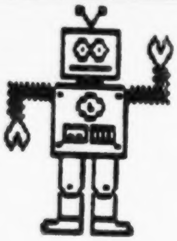
ABACUS



SPACE BAR



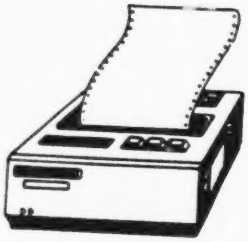
MATCHING



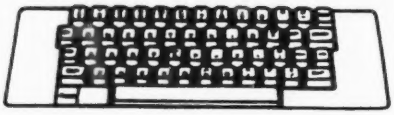
POSTTEST
LEVELS 1,2

DIRECTIONS: DRAW A LINE FROM THE WORD TO THE CORRECT PICTURE.

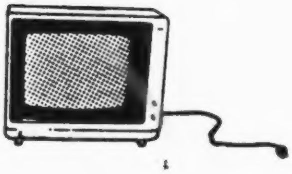
DISK DRIVE



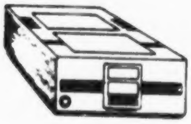
FLOWCHART



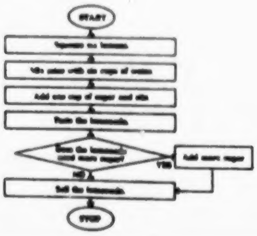
PRINTER

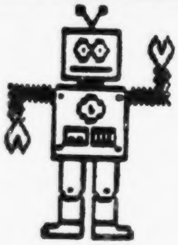


MONITOR



KEYBOARD


START
YES
Add more sugar
NO
STOP



POSTTEST - LEVEL 1

Circle the right answer (a, b, c, or d) for each of the questions below.

1. The screen that shows information is a:
   a. Keyboard
   b. Diskdrive
   c. Monitor
   d. Compiler

2. A cursor is:
   a. A blinking light on the screen
   b. Someone who swears a lot
   c. An indicator light that tells you if the power is on
   d. A person who keeps forgetting to press return

3. To put a program into a computer, you must type:
   a. "PUT"
   b. "LOAD"
   c. "RUN"
   d. "PRINT"

4. To get the microcomputer to do a program, you must type:
   a. "PRINT"
   b. "EXECUTE"
   c. "COMPUTE"
   d. "RUN"

5. Which of these is "zero" on the computer?
   a. 0
   b. Ø
   c. Both a and b
   d. Neither a nor b

6. To type the upper character of a key, you must first press:
   a. "ESC"
   b. "SHIFT"
   c. "DELETE"
   d. "RETURN"

7. Which statement produces output?
   a. "PRINT"
   b. "LET"
   c. "GOTO"
   d. "IF/THEN"

8. Computer programs are called:
   a. Microprocessors
   b. Hardware
   c. Indata
   d. Software

9. A computer printout is:
   a. Writing on a screen
   b. Printed results on paper
   c. Time when the computer is working
   d. Outdata

10. A computer:
   a. Accepts information
   b. Stores information
   c. Processes information
   d. All of the above

11. The mechanical parts of a computer are called:
   a. Software
   b. Programs
   c. Hardware
   d. Diskettes

12. Computer data is stored in:
   a. Memory
   b. The keyboard
   c. The screen
   d. Input

13. Answers given to you by the computer are:
    a. Usually wrong
    b. Input
    c. Software
    d. Output

14. A computer which could handle a large company's business is a:
    a. Minicomputer
    b. Microcomputer
    c. Microprocessor
    d. Mainframe

15. The father of computers was:
    a. Pascal
    b. Babbage
    c. Hollerith
    d. Jacquard

16. The fastest computers are from what generation?
    a. First
    b. Second
    c. Third
    d. Fourth

17. "Debugging" means:
    a. Fixing mistakes in a program
    b. Killing bugs inside the computer
    c. Turning off the computer
    d. Removing computer hardware

18. Information processed by a computer is called:
    a. Floppy disk
    b. Printout
    c. Hardware
    d. Data

19. Copying commercial software programs:
    a. Is illegal
    b. Is OK if code can be broken
    c. Is OK if you have permission
    d. Is OK if teacher knows

20. Choose the true statement:

   a. Computers need instructions to work
   b. Computers have brains
   c. Computers are smarter than humans
   d. All of the above

21. Adding, dropping, or changing a line of code is called:

   a. Fixing
   b. Dropping
   c. Editing
   d. Clearing

22. When you finish typing a line, you must press the:

   a. Control key
   b. Shift key
   c. Delete key
   d. Return key

23. Another symbol for "PRINT" is:

   a. *
   b. &
   c. ?
   d. %

24. A computer program is:

   a. A computer chip in the back of the computer
   b. A peripheral output device
   c. A set of instructions for the computer
   d. Hardware

25. To store a program for future use, you must type:

   a. "SAVE"
   b. "LOAD"
   c. "KEEP"
   d. "NEW"

26. The first thing a line of code must have is:

   a. A line number
   b. A keyword
   c. Instructions
   d. A line number and keyword

27. To list programs on a disk, you type:
    a. "RUN"
    b. "CATALOG"
    c. "LIST"
    d. "SEARCH"

28. The computer will print only what:
    a. You type in
    b. You type within " " Marks
    c. Is capitalized
    d. Starts with a line number

29. If the computer does not understand what you typed, the screen will say:
    a. "TRY AGAIN"
    b. "RUN"
    c. "SYNTAX ERROR"
    d. "QUIT"

30. Which program prints "Name" over and over:

a.
```
10 print "Name"
20 GOTO 20
```

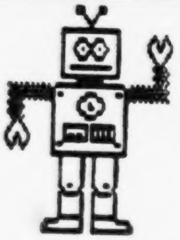
b.
```
10 print "Name"
20 GOTO 10
```

c.
```
10 print Name
20 GOTO 10
```

d.
```
10 print Name
20 print " GOTO 10
```

LEVEL 1

Area	# of Questions	Number Right	Percent Right
Computer Operations	7		
Computer Awareness	13		
Basic Programming	10		
TOTAL	30		



POSTTEST - LEVEL 2

Circle the right answer (a, b, c, or d) for each of the questions below:

1. A cursor is:
    - a. A blinking light on the screen
    - b. Someone who swears a lot
    - c. An indicator light that tells you if the power is on
    - d. A person who keeps forgetting to press return
2. The screen that shows information is a:
    - a. Keyboard
    - b. Diskdrive
    - c. Monitor
    - d. Compiler
3. Enter information into the computer by pressing:
    - a. "SHIFT"
    - b. "ESC"
    - c. "DELETE"
    - d. "RETURN"
4. Which statement produces output?
    - a. "PRINT"
    - b. "LET"
    - c. "GOTO"
    - d. "IF/THEN"
5. To put a program into a computer, you must type:
    - a. "PUT"
    - b. "LOAD"
    - c. "RUN"
    - d. "PRINT"

6. Which symbol tells the computer to multiply numbers?
   a. /
   b. +
   c. X
   d. *

7. To get the microcomputer to do a program, you must type:
   a. "PRINT"
   b. "EXECUTE"
   c. "COMPUTE"
   d. "RUN"

8. To type the upper character of a key, you must first press:
   a. "ESC"
   b. "SHIFT"
   c. "DELETE"
   d. "RETURN"

9. The father of computers was:
   a. Pascal
   b. Babbage
   c. Hollerith
   d. Jacquard

10. The first programmer was:
   a. Hollerith
   b. Lovelace
   c. Babbage
   c. Boole

11. Napier's bones were:
   a. A first generation computer
   b. A primitive multiplication machine
   c. Man's first aid to counting
   d. The first adding machine

12. The number system used by computers is the:
   a. Binary system
   b. Decimal number system
   c. Metric system
   d. Roman numeral system

13. What type of computer would an airline use to make reservations?
    - a. Mainframe computer
    - b. Minicomputer
    - c. Microcomputer
    - d. Digital computer

14. "Debugging" means:
    - a. Fixing mistakes in a program
    - b. Killing bugs inside the computer
    - c. Turning off the computer
    - d. Removing computer hardware

15. Pictures and graphs drawn by a computer are called:
    - a. Programming
    - b. Text display
    - c. Computer graphics
    - d. Photographing

16. Computer programs are called:
    - a. Microprocessors
    - b. Hardware
    - c. Indata
    - d. Software

17. A computer printout is:
    - a. Writing on a screen
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    - c. Time when the computer is working
    - d. Outdata

18. A computer:
    - a. Accepts information
    - b. Stores information
    - c. Processes information
    - d. All of the above

19. The mechanical parts of a computer are called:
    - a. Software
    - b. Programs
    - c. Hardware
    - d. Diskettes

20. Computer data is stored in:
    a. Memory
    b. The Keyboard
    c. The Screen
    d. Input

21. Answers given to you by the computer are:
    a. Usually wrong
    b. Input
    c. Software
    d. Output

22. Information processed by a computer is called:
    a. Floppy disk
    b. Printout
    c. Hardware
    d. Data

23. The fastest computers are from what generation?
    a. First
    b. Second
    c. Third
    d. Fourth

24. Copying commercial software programs:
    a. Is illegal
    b. Is OK if code can be broken
    c. Is OK if you have permission
    d. Is OK if teacher knows

25. Choose the true statement:
    a. Computers need instructions to work
    b. Computers have brains
    c. Computers are smarter than humans
    d. All of the above

26. Adding, dropping, or changing a line of code is called:
    a. Fixing
    b. Dropping
    c. Editing
    d. Clearing

27. The command to display the program on the screen is:

a. "NEW"

b. "GOTO"

c. "LIST"

d. "READ"

28. Which program prints "NAME" over and over:

a.
```
10 print "NAME"
20 GOTO 20
```

b.
```
10 print "NAME"
20 GOTO 10
```

c.
```
10 print NAME
20 GOTO 10
```

d.
```
10 print NAME
20 print " GOTO 10
```

29. Which program counts to 10?

a.
```
10 for I=0 to 10
20 print I
30 GOTO 10
```

b.
```
10 for I=0 to 10
20 print I
30 next I
```

c.
```
10 for I=0 to 10
20 next I
30 print I
```

d.
```
10 next I
20 for I = 0 to 10
30 print I
```

30. A word or any group of characters that is not a number is called:

a. A string

b. A SYNTAX error

c. A scientific notation

d. An exponent

31. To list programs on a disk, you type:

a. "RUN"

b. "CATALOG"

c. "LIST"

d. "SEARCH"

32. The computer will print only what:
    a. You type in
    b. You type within " " marks
    c. Is capitalized
    d. Starts with a line number

33. If the computer does not understand what you typed, the screen will say:
    a. "TRY AGAIN"
    b. "RUN"
    c. "SYNTAX ERROR"
    d. "QUIT"

34. When you finish typing a line, you must press the:
    a. Control key
    b. Shift key
    c. Delete key
    d. Return key

35. Another symbol for "PRINT" is:
    a. *
    b. &
    c. ?
    d. %

36. A computer program is:
    a. A computer chip in the back of the computer
    b. A peripheral output device
    c. A set of instructions for the computer
    d. Hardware

37. To store a program for future use, you must type:
    a. "SAVE"
    b. "LOAD"
    c. "KEEP"
    d. "NEW"

38. The first thing a line of code must have is:
    a. A line number
    b. A keyword
    c. Instructions
    d. A line number and keyword

39. To diagram what will happen in a program, programmers use a:
    a. Computer
    b. Flow chart
    c. Logic machine
    d. Plotter

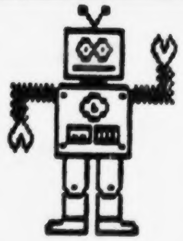
40. To change 10 print "HELLO" to print the word "GOODBYE" type:
    a. RUN
    b. 20 change "HELLO" to "GOODBYE"
    c. Nothing. It can not be changed.
    d. 10 print "GOODBYE"

LEVEL 2

Area	# of Questions	Number Right	Percent Right
Computer Operations	8		
Computer Awareness	17		
Basic Programming	15		
TOTAL	40		

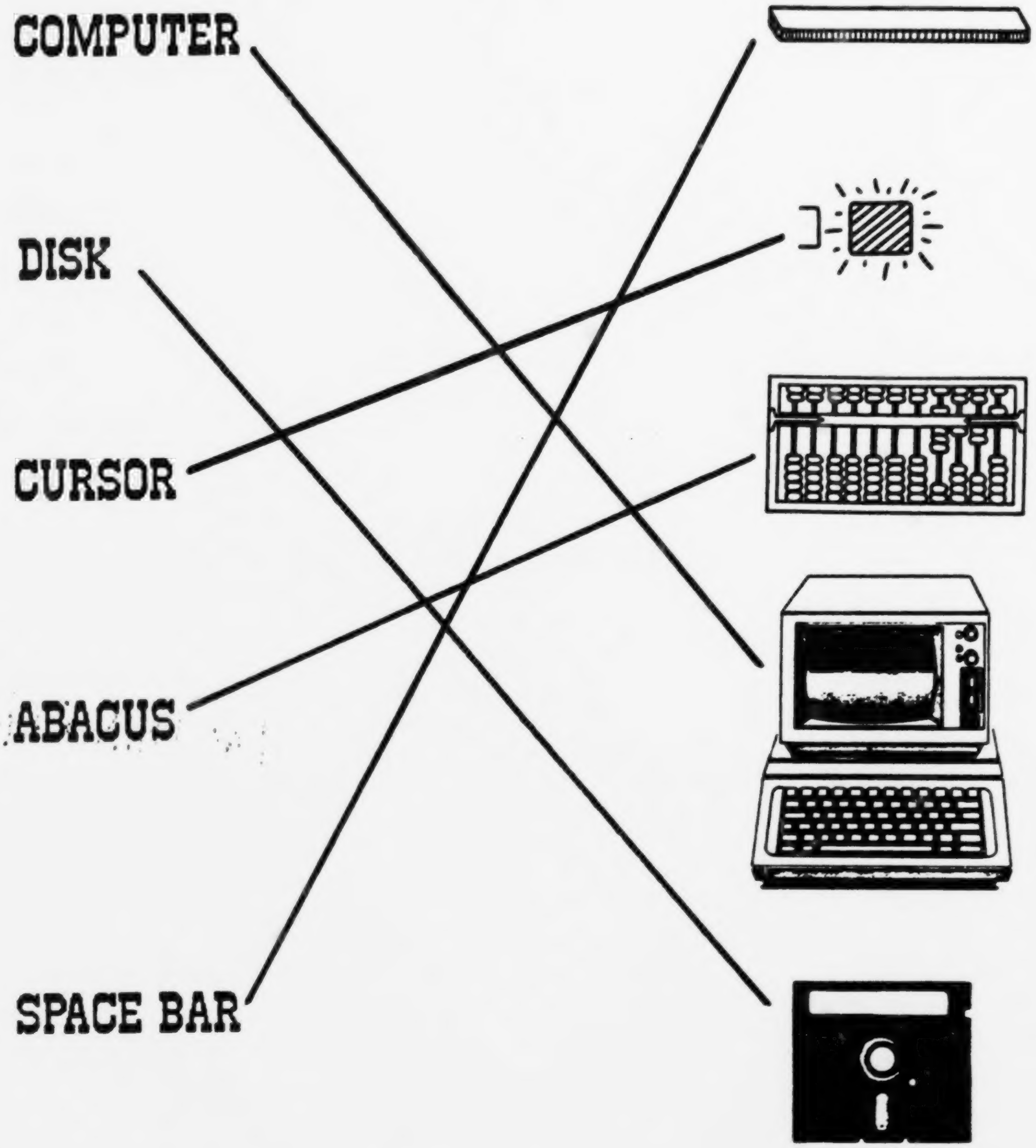
ANSWER SHEET

MATCHING



POSTTEST LEVELS 1,2

DIRECTIONS: DRAW A LINE FROM THE WORD TO THE CORRECT PICTURE.



COMPUTER

DISK

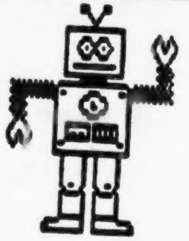
CURSOR

ABACUS

SPACE BAR

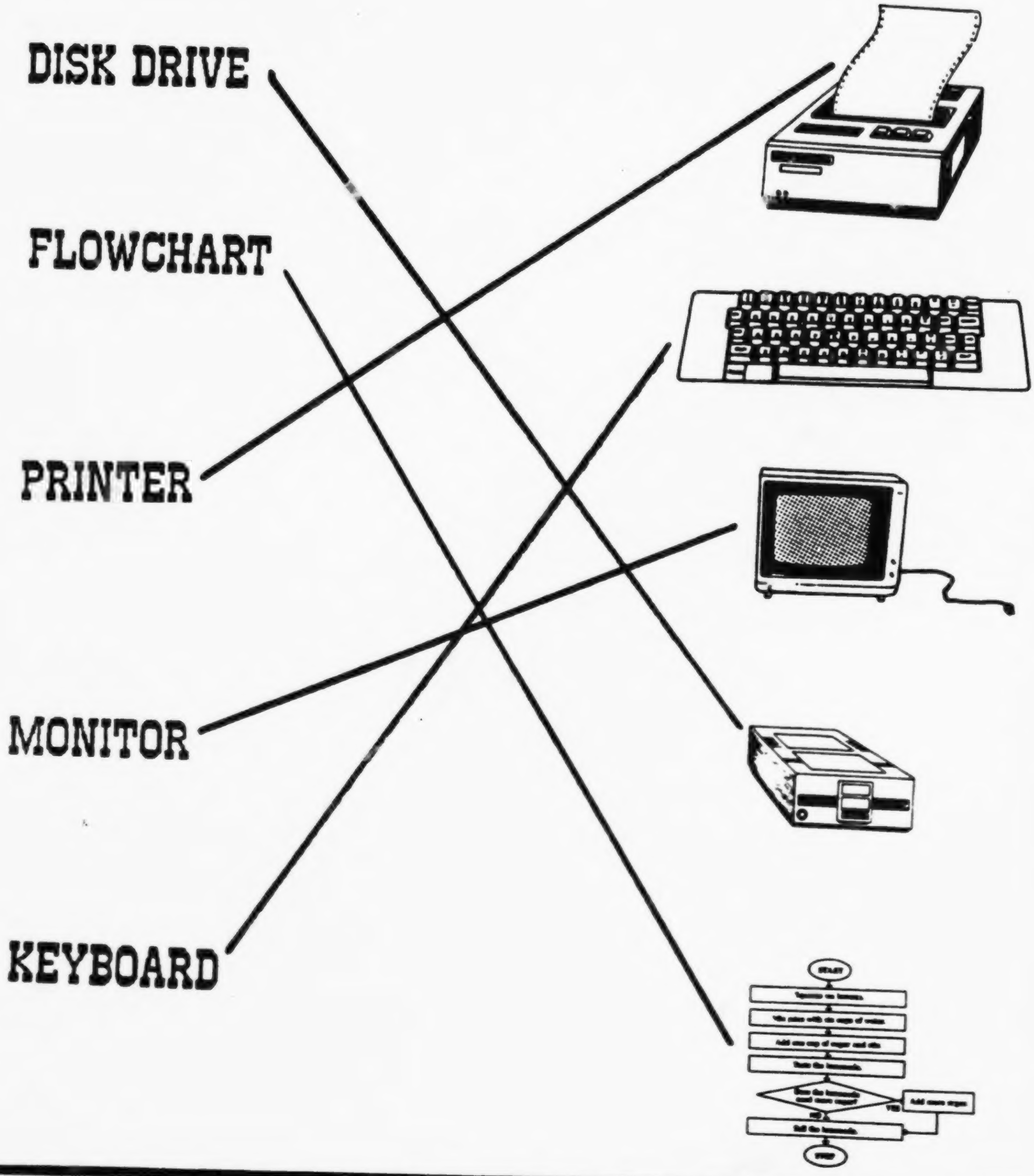
ANSWER SHEET

MATCHING

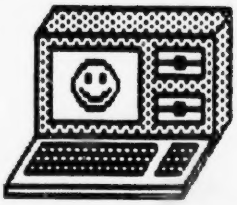


POSTTEST
LEVELS 1,2

DIRECTIONS: DRAW A LINE FROM THE WORD
TO THE CORRECT PICTURE.


DISK DRIVE
FLOWCHART
PRINTER
MONITOR
KEYBOARD

BEST COPY AVAILABLE



POSTTEST ANSWERS

Multiple Choice	Level 1	Level 2
1.	c	a
2.	a	c
3.	b	d *
4.	d	a
5.	b	b
6.	b	d
7.	a	d
8.	d	b
9.	b	b
10.	d	b
11.	c	b
12.	a	a
13.	d	a
14.	d	a
15.	b	c
16.	d	d
17.	a	b
18.	d	d
19.	c	c
20.	a	a
21.	c	d
22.	d *	d
23.	c	d
24.	c	c
25.	a	a
26.	a	c
27.	b	c
28.	b	b
29.	c	b
30.	b	a
31.		b
32.		b
33.		c
34.		d
35.		c
36.		c
37.		a
38.		a
39.		b
40.		d

*or Enter